5

FOR OFFICIAL USE ONLY

JPRS L/8205

5 January 1979

[redacted]

USSR

[redacted]

[redacted]

TRANSLATIONS ON USSR RESOURCES
(FOUO 1/79)

U. S. JOINT PUBLICATIONS RESEARCH SERVICE

[redacted]

FOR USE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

APPROVED FOR RELEASE: 2007/02/08: CIA-RDP82-00850R000100010012-6

BIBLIOGRAPHIC DATA SHEET	1. Report No. JPRS L/ 8205	2.	3. Recipient's Accession No.
4. Title and Subtitle TRANSLATIONS ON USSR RESOURCES, (FOUO 1./79)			5. Report Date 5 January 1979 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Organization Name and Address Joint Publications Research Service 1000 North Glebe Road Arlington, Virginia 22201			10. Project/Task/Work Unit No. 11. Contract/Grant No.
12. Sponsoring Organization Name and Address As above			13. Type of Report & Period Covered 14.

15. Supplementary Notes

16. Abstracts

This serial report contains information on energy, fuels and related equipment; fishing industry and marine resources; water resources, minerals, timber, and electric power.

17. Key Words and Document Analysis. 17a. Descriptors

USSR
Natural Resources
Electric Power
Energy
Energy Conservation
Fisheries
Fuels
Minerals
Timber
Water Supply

17b. Identifiers/Open-Ended Terms

17c. COSATI Field/Group 5C, 10, 21D, 2C, 8G, 2F

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
FOR OFFICIAL USE ONLY. Limited Number of Copies Available From JPRS	UNCLASSIFIED	94
	20. Security Class (This Page) UNCLASSIFIED	22. Price

FORM NTIS-35 (REV. 3-72)

THIS FORM MAY BE REPRODUCED

USCOMM-DC 14952-P72

JPRS L/8205

5 January 1979

TRANSLATIONS ON USSR RESOURCES

(FOUO 1/79)

CONTENTS PAGE

ENERGY CONSERVATION

RATIONAL USE OF NATURAL GAS -- AN IMPORTANT TASK OF THE TENTH FIVE-YEAR PLAN

Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 10, Oct 78 pp 12-14

[Article by G. I. Ibragimov, engineer, Moscow Territorial Inspection of Gosgaznadzor]

[Text] Natural gas, as an economic form of fuel, is extensively used in many areas of production, and is conducive to an increase in labor productivity, attainment of high efficiency in technological processes and a reduction in the specific expenditures of fuel. A reliable supply of high-quality fuel to the national economy requires an increase in gas recovery and more efficient use of gas. In this connection, an important part is played by the technical-economic indices of operation of heat and power equipment. The Moscow Territorial Inspection of Gosgaznadzor SSSR carries out direct supervision over rational utilization of gas, adherence to strict measures of economy and elimination of losses of gas during consumption.

Work on economy of fuel-energy resources in enterprises and organizations is being done in areas of reducing losses in heating networks, rationalizing technological processes, introducing new equipment and updating old equipment, more complete utilization of secondary heat, improvement of normalization, and supervising rational expenditure of thermal energy. Each year industrial enterprises work out plans for organizational-technical measures to satisfy the confirmed quotas on saving of energy resources. Fuel and thermal energy are economized every year by the collectives of the Stankolit Plant, the Serp i Molot Plant and the Lyublin Foundry. For instance in 1977 the Serp i Molot Plant saved 1.5 million cu. m of gas and 3148 Gcal of thermal energy.

Practice has shown that where the management of an enterprise, the Party, Komsomol and trade union organizations are at the head of creative initiative of workers and engineering-technical personnel and wage a daily battle for technical progress, the introduction of leading experience, perfection of the organization of labor and production, the internal reserves of production are most fully utilized and higher indices with respect to economy of energy resources are attained. At the same time, the proper concern is not being given to this important matter in a number of enterprises. In many factories and plants there are shortcomings in the use of natural gas, wastage of fuel, nonproductive losses of thermal energy.

A check made in 1977 showed that 31 out of 266 Moscow enterprises (the Central Motion Picture Studio of Children's and Young People's films imeni M. Gor'kiy, Furniture Factory No 3, the Mossel'mash Plant and others) are not using such an important reserve of fuel savings as utilization of the heat of combustion products, and the economizers installed on boilers are not working in ten enterprises (the Technical Pilot Plant imeni Klara Tsetkiya, Wool Spinning Plant No 14 and others). The temperature of the departing gases after the boilers in these enterprises reaches 300°C, which leads to overuse of fuel and a 4-6% reduction in boiler efficiency.

One of the methods of improving efficiency in the use of natural gas is to do regime-adjustment tests on gas-using facilities with preparation of regime charts. This enables operation of equipment with optimum parameters and minimum gas consumption. However, it has been established in the course of inspection that such work has not been done in 106 industrial enterprises of Moscow (the RTI-2 Plant, the Kauchuk Production Association, the Carding Factory imeni the Seventh Anniversary of the October Revolution and others), while in 24 enterprises (the October Streetcar Depot, Furniture Combine No 3 and others) the gas-using facilities are being operated with considerable deviations from the regime charts due to the lack of skill on the part of service personnel.

One of the bottlenecks in operation of gas-using equipment is that boilers are not equipped with automatic gas analyzers that determine the carbon dioxide content or oxygen content in combustion products. Without such gas analyzers it is practically impossible to make a reliable check on the quality of gas combustion and adherence to the working conditions of equipment. The check showed that automatic gas analyzers are lacking in 110 industrial enterprises (the Lyublin Fruit and Vegetable Office, the Goznak Printing Plant and others), while a considerable number of installed gas analyzers are not in operation in 42 enterprises (the Beskudnikovskiy Construction material and Structural Element Combine No 1, the Technical Articles Plant and others).

Automation of the control of combustion processes should play a large part in normalizing the operation of gas-using equipment. However, it has been established that 77 industrial enterprises (the Technical Photoplate Plant, the Carding Factory and others) lack automatic equipment for combustion control, while the equipment in 38 enterprises (the Krasnyy Proletariy Printing Plant, Tool Plant No 5 of the Moszhilpromsnab Trust and others) is not operating. The combustion of gas in antiquated equipment leads to considerable losses. Antiquated, uneconomical boilers (with efficiency of 60-80%) are being used in 55 enterprises of the city (the Port Refrigeration Combine, the Krasnyy Put' Machine Plant and others), resulting in a loss of up to 10% in fuel burned.

At the Trolleybus Repair Plant, the Experimental Glass Plant and elsewhere no account is kept of fuel expenditure and thermal energy produced, so that the actual specific norms of fuel consumption cannot be determined. However,

these enterprises systematically put in a report on satisfaction of the norms for gas consumption on form 11-sn thus distorting the State report.

The measure of consumption of energy resources is the norm for fuel consumption established for units of measurement of goods produced. The technically and economically substantiated norms should correspond to the current level of leading technology and organization of production, and stimulate workers and collectives of enterprises to find reserves of economy of fuel and energy resources. In this connection there must be an appreciable increase in the role of methodical work on normalizing fuel and energy resources on all levels of management of the national economy.

It should be noted that a number of ministries and agencies are not keeping good track of the use of fuels in subordinate enterprises, and sometimes approve overstated norms. For instance the specific norms of fuel consumption are overstated in a number of enterprises of the Ministry of the Meat and Dairy Industry of the USSR: at the Ochakovskiy Dairy Plant -- by 9.9 kg of ideal fuel per Gcal (leading to an overconsumption of 1 million cu. m of gas per year), at the Moscow Poultry Combine -- by 17 kg per Gcal (the overconsumption of gas amounts to about 0.5 million.cu. m per year). In many enterprises (the fruit and vegetable bases of Baumanskiy, Proletarskiy and other rayons) there are no technically substantiated norms of fuel consumption.

Economy of fuel and energy resources depends to a consderable extent on the development and implementation of specific measures to save fuel (gas). However, such measures have not been worked out at the Dzerzhinskiy Fruit and Vegetable Office, at the Technical Photoplate Plant and elsewhere.

Installed at the Osvobozhdennyy Trud Fine Fabric Factory and the weaving and finishing combine in the Burevestnik Production Association are up-to-date type DKVR-6.5-13 boilers that according to plan should be equipped with automatic equipment, instruments and utilizers of the heat of combustion products. It was established by the check that utilizers are not installed on the boilers (this leads to overconsumption of gas, and to a 4-6% reduction in boiler efficiency), automatic equipment for combustion regulation is lacking, the quality of fuel combustion is not being monitored, and no account is being kept on the thermal energy produced and used. Each year in these enterprises there is an overconsumption of about 1 million cu. m of gas (400,000, 400,000 and 150,000 cu. m respecitvely [sic]). The same pattern is observed at the Auto Repair Plant No 2 and the Experimental Pilot Metal Plant, where overconsumption amounts to about 300,000 cu. m of gas per year, or 8-10% of the yearly consumption of gas by these enterprises. The Auto Repair Plant No 2 has not even worked out plans for organizational-technical steps to conserve fuel and thermal energy.

At Refrigerator No 9 the instruments that account for the amount of heat produced by the boilers and that determine the temperature and composition

of the departing gas are not working, there is no automated equipment for regulating processes of gas combustion, regime-adjustment tests are not being done on the DKVR-6.5-13 boiler, and heat is being lost on uninsulated sections of the steam lines. The enterprise has not worked out specific norms of fuel consumption on the production of thermal energy. Losses of gas amount to 5-6% of the annual consumption.

The examples of wasteful use of gas turned up by the Inspection as well as the violations of discipline in gas consumption at industrial enterprises have been examined regularly by the Municipal People's Control Committee and at sessions of the Moscow Gorispolkom. Nevertheless, the directors of a number of enterprises have not taken the necessary steps. For instance a repeated check has shown that Refrigeration Combine No 8, the Ochakovskiy Dairy Plant, the Udarnitsa Candy Factory and Refrigeration Plant No 12 have not carried out a number of directives made by the Inspection in 1974. The insufficient attention given by enterprise directors to work on saving fuel resources is the basic reason for shortcomings in the use of natural gas.

A definite daily norm for fuel consumption is now being set up for every enterprise. The Derebenevskiy and Kuskovskiy Chemical Plants, the Beskudnikovskiy Construction Material and Structural Element Combine No 1 and others are exceeding their mean daily and weekly limits.

Under conditions of constant increase in gas consumption and remoteness of consumers from the sources of supply it is important to observe discipline in gas consumption and to increase efficiency in the use of gas. The main areas for improving efficiency in the use of natural gas in industrial enterprises are:

preventive maintenance of gas-using and heat-using equipment, as well as regime-adjustment work and gas combustion in strict conformity with regime charts (the possible fuel savings is 3-5% of the annual consumption of gas by enterprises);

introducing systems for automatic regulation of combustion with correction for the composition of combustion products (possible savings 1-4%);

effective utilization of the heat of departing gases, and also heat of low-parameter steam (possible savings 4-8%);

reducing heat losses by improving the insulation of pipelines and heat-using equipment (possible savings 10-15%);

changing the heating systems of enterprises from steam to hot water (possible savings 3-4%);

reconstructing and improving heat supply systems, automating and regulating heating and ventilation systems (possible savings 10-12%);

increasing the collection and improving the utilization of condensate (possible savings 5-10%);

replacing or updating antiquated, low-capacity and unproductive gas-using equipment (possible savings 5-10%).

Facing the directors of enterprises and organizations in the Tenth Five-Year Plan are great problems on mobilizing all reserves of savings of energy resources and accounting for their consumption. In industry, more than 30% of the total savings of boiler and furnace fuel is to be realized by introducing new equipment and improving the economy of equipment now in use, perfecting and intensifying technological processes, introducing power-technological processes with a simultaneous increase in the unit power of facilities, perfecting gas-burner devices, automating production processes and using secondary energy resources. Expansion of the volumes of utilization of secondary energy resources will save about 18 million metric tons of ideal fuel in 1980 as compared with 1975. The national economic value of using secondary energy resources in industry lies both in fuel savings and in a considerable reduction in material and labor inputs on extraction and transportation of fuel.

During the Tenth Five-Year Plan there is to be an increase in the output of utilization equipment and spare parts for it, extensive use of evaporative cooling systems on high steam parameters in industrial furnaces of ferrous and nonferrous metallurgy and the chemical industry, and use of secondary energy resources in agencies for heat supply to industrial and residential areas.

6610
CSO: 8144/0394

FUELS AND RELATED EQUIPMENT

UDC 622.321(03)

CHIEF GAS DEPOSITS OF NORTHERN EUROPEAN USSR, WESTERN SIBERIA

Moscow PRIRODNYYE GAZY MESTOROZHDENIY SOVETSKOGO SOYUZA in Russian 1978 signed to press 10 Mar 78 pp 42-95

[Section "Characteristics of Natural Gases" from the book "Prirodnyye Gazy Mestorozhdeniy Sovetskogo Soyuza" (Natural Gases of the Deposits of the Soviet Union) by A. K. Karpov and V. N. Raaben, Izdatel'stvo Nedra, Moscow, 5,300 copies, 320 pages]

[Text] Deposits of the Northern European USSR

Petroleum, gas, and gas condensate deposits have been discovered in the Komi ASSR, the Nenets Autonomous District, and Arkhangel'skaya Oblast of the Northern European USSR.

This petroleum-gas region is located in the Timan-Pechora region, which encompasses a vast area bounded by the Ural and Pay-Khoy uplifts in the east, the Polyudova Kamnya uplift in the south, and the Timan Ridge in the west (see Figure 1 below). The first pool of heavy crude oil found in the Pechora petroleum-gas region was confined to the Chibyusskaya Series of the Middle Devonian.

The Yaregskoye Deposit

This deposit began to be worked in 1933. In 1939 extraction by the underground shaft method was begun; in 1953 well drilling draining layers on a 12-15 meter grid was introduced. The oil pool covered a vast area, was extremely long (260-300 kilometers), and was worked by several shafts.

The composition of the petroleum gases from this despoit was studied in detail for shafts Nos 1, 2, and 3.

The studies established that the petroleum gases of the Yaregskoye deposit are dry methane gases. They have a methane concentration of 95-98 percent with 0.1-2.0 percent nitrogen, 0.7-2.5 percent carbon dioxide, and no hydrogen sulfide. Among the homologues of methane the gases contain small amounts of ethane, propane, and higher molecular hydrocarbons.

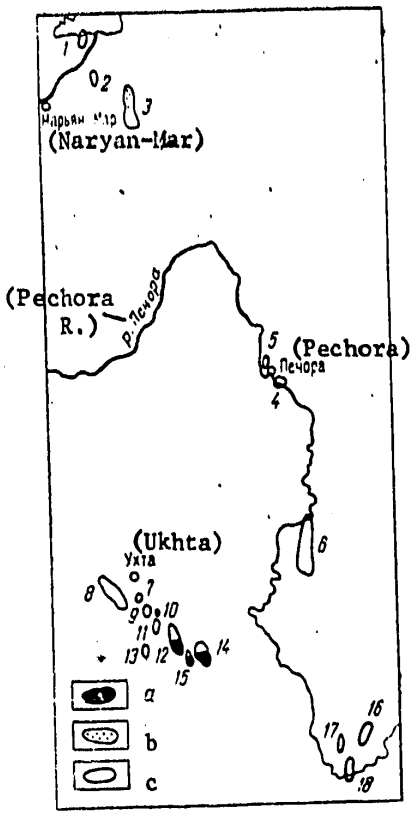


Figure 1. Map of the Locations of Deposits of the Timan-Pechora Petroleum-Gas Province

Key:
(a) Petroleum;
(b) Patroleum-Gas;
(c) Gas;
(1) Kumzhinskoye;
(2) Vaneyvisskoye;
(3) Layavozhskoye;
(4) Pechorogorodskoye;
(5) Pechorokozhvinskoye;
(6) Vuktyl'skoye;
(7) Nyamedskoye;
(8) Yaregskoye;
(9) Kush-Kodshskoye;
(10) Sed'-Iol'skoye;
(11) Voy-Vozh;
(12) Nibel';
(13) Zapadno-Tskos'gorskoye;
(14) Nizhneomrinskoye;
(15) Verkhneomrinskoye;
(16) Pachginskoye;
(17) Rassokhinskoye;
(18) Kur'inskoye.

The composition of the gas differs little at different sites in the shafts. There is some variation in content of carbon dioxide; the concentration of CO_2 is greater (up to two percent) in the gases of the old, worked sectors of the pool and less in the gases from the new drilled wells and boreholes.

The gases from petroleum shaft No 3, which was put into operation later than Nos 1 and 2, contain more homologues of methane and nitrogen.

The composition of the petroleum gas of the Yaregskoye deposit given off into the atmosphere during degassing to atmospheric pressure is shown in the data contained in Table 6 (next page).

The composition of the residual dissolved gas is: CH_4 -- 97.8 percent; C_2H_6 -- 0.18; C_3H_8 -- 0.07; C_4H_{10} -- 0.02; C_5 and higher -- 0.02; N_2 -- 1.1; and CO_2 -- 0.7 percent. There is about 0.05 cubic meters per ton of this gas.

These compositions of petroleum gases from the Yaregskoye deposit illustrate that the gases of gas pools are not the only source of dry methane gases.

In addition to the Yaregskoye petroleum deposit, the only deposit in the Soviet Union where petroleum was extracted by the shaft method, pools of heavy crude oil containing small amounts of dissolved gas were worked in the Chelbasskoye deposit in the Ukhta and Troitsko-Pechora region.

In subsequent years various large deposits were discovered and worked in this region. Among these deposits were the Sed'-Iol'skoye gas deposit (1935); the petroleum-gas deposits of Voy-Vozh (1943), Nibel' (1945), Verkhneomrinskoye and Nizhneomrinskoye (1949, 1950), Nyamedskoye (1947), Kush-Kodshskoye (1949), and Dzhebol'skoye (1956); the petroleum deposits of Zapadno-Tebukskoye (1959), Lem'yusskoye (1960), Michayusskoye (1961), Vostochno-Savinoborskoye (1961), and Usinskoye (1962); the gas deposits of Pechorogorodskoye (1965), Pechorokozhevenskoye (1964), and others.

Table 6. Average Composition of Gases (in Percentages) of the Yaregskoye Deposit Released from Petroleum During Degassing at 25 kgf/cm^2.

Component	Number of the Shaft		
	No 1	No 2	No 3
Methane	97.3	97.0	95.2
Ethane	0.2	0.21	0.5
Propane	0.055	0.06	0.25
Butane	0.015	0.02	0.25
Pentane and Higher Forms	0.01	0.02	0.1
Nitrogen	0.73	0.8	1.5
Carbon Dioxide	1.7	1.9	2.2

For a long time the Pechora petroleum-gas province was worked as a petroleum region. In the last decade, however, the large Vuktyl'skoye gas condensate deposit has been discovered in this region.

The northern part of the province has not been adequately studied. Most of the deposits are located in the southern part of the Izhma-Pechora basin.

In this region industrially feasible gas and petroleum has been identified in beds of the Devonian, Carboniferous, and Permian systems.

In the Devonian beds the following productive horizons have been identified in the Poddomanikov stratum: III, II, Iv, Ib, and Ia. The carbonate rocks of the Zadonsko-Yelets strata of the Filenskiy Stage and the Ukhta strata of the Franskiy Stage also contain gas.

Industrially feasible gas in Lower Permian carbonate rock has been proven at the Vuktyl'skoye gas condensate deposite, which is located in the Sub-Ural trough, where Carboniferous carbonate rocks are also productive.

The Vuktyl'skoye Deposit

This gas condensate deposit, located 150 kilometers from the city of Ukhta, occurs in a large asymmetric anticlinal fold.

The pool is identified in carbonate beds of the Lower Permian and Upper, Middle, and Lower Carboniferous. The productive layer has interlayering of limestone with dolomite and dolomitized limestone. Terrigenous beds, chiefly argillites, form some interlayers and play a significant part in the beds of the Verkhnekartinskiy Subatage of the Lower Permian and the Yasnopolyanskiy Horizon of the Lower Carboniferous.

The Vuktyl pool is a massive type with alternating zones of different collection characteristics and productivity.

The microfractures in the traps of the deposit join the entire carbonate mass into a single hydrodynamic system.

The initial layer pressure at the 3,025 meter marker was 370 kilogram-force per square centimeter; the temperature was 62 degrees C.

The gases of the Vuktyl'skoye deposit contain up to nine percent ethane, about two percent propane, more than one percent other homologues of methane, 5-7 percent nitrogen, and 0.1 percent carbon dioxide. There is no hydrogen sulfide in the gases.

Layer pressure is not maintained during working of the deposit; during the period that it has been worked the layer pressure has dropped greatly.

The composition of the gas extracted at the Vuktyl'skoye deposit is shown in Table 7 (next page).

Low-temperature separation units are used at the Vultyl field to remove hydrocarbon condensate and moisture from the gas up to a temperature of dew point minus 10 degrees C.

The unstable condensate, degassed at 25 kilogram-force per square centimeter, is transported by a condensate line to a gas refinery where it is stabilized and the hydrocarbons are separated out. The refinery produces products for market and feeds gas into the gas transport system.

The gas has excellent market characteristics with respect to heat of burning and a complete absence of sulfur-containing compounds, as well as low levels of CO_2. The top heat of burning of market gas from the Vyktyl'skoye deposit is 8,900 gigacalories per cubic meter (at 20 degrees C. and 760 millimeters mercury column).

The composition of the gas delivered from the Vuktyl field to the trunk gas pipeline is shown in Table 8 (page after next).

Table 7. Description of the Gases of the Vuktyl'skoye Despoit (Permian Beds)

(a) Номер скважины	(b) Содержание компонентов, %									Σ, %	(d) Плотность по воз-духу	(e) Теплота сгорания низшая, ккал/м³
	CO_2	CH_4	C_2H_6	C_3H_8	$i\text{-}C_4H_{10}$	$n\text{-}C_4H_{10}$	$i\text{-}C_5H_{12}$	$n\text{-}C_5H_{12}$	(c) C_6+высшие			
33	0,15	81,3	9,1	2,5	0,33	0,65	0,20	0,18	0,4	5,2	0,679	8880
13	0,13	82,1	8,7	2,4	0,32	0,62	0,19	0,18	0,4	5,0	0,676	8850
168	0,17	80,4	9,3	2,7	0,40	0,81	0,25	0,23	0,4	5,4	0,686	8980
6	0,20	80,7	9,1	2,5	0,37	0,62	0,18	0,15	0,4	5,8	0,683	8820
7	0,15	81,1	8,9	2,7	0,39	0,77	0,30	0,28	0,5	5,0	0,693	9030
108	0,1	79,1	10,1	3,0	0,43	0,80	0,25	0,23	0,4	4,9	0,697	9100
38*	0,20	81,4	8,5	2,3	0,34	0,54	0,17	0,15	0,4	6,0	0,679	8710

Key: * Carboniferous Beds.
(a) Well Number;
(b) Percentage Content of Component;
(c) C_6 and Higher;
(d) Density Relative to Air;
(e) Lowest Heat of Burning, gcal/m^3.

Table 8. Description of Vuktyl'skoye Gas Entering the Pipeline

Дата анализа (a)	(b) Содержание компонентов, %										Теплота сгорания, (c) ккал/м³		Плотность по воздуху (f)
	CO_2	CH_4	C_2H_6	C_3H_8	$i\text{-}C_4H_{10}$	$n\text{-}C_4H_{10}$	$i\text{-}C_5H_{12}$	$n\text{-}C_5H_{12}$	C_6+высшие	N_2	низшая (d)	высшая (e)	
VI 1970 г.	0,3	78,7	10,0	2,3	0,31	0,46	0,09	0,08	0,01	7,7	8490	9370	0,689
VI 1970 г.	0,3	78,6	10,0	2,3	0,31	0,46	0,09	0,09	0,01	7,4	8470	9360	0,678
VI 1970 г.	0,25	78,8	10,4	2,4	0,32	0,48	0,09	0,09	0,01	7,2	8570	9470	0,682
VIII 1972 г.	0,16	82,8	8,4	2,8	0,38	0,63	0,13	0,11	0,06	4,5	8790	9710	0,669
IX 1972 г.	0,32	82,6	8,3	2,8	0,39	0,63	0,12	0,11	0,05	4,5	8770	9690	0,675
X 1972 г.	0,60	81,8	8,4	2,9	0,38	0,62	0,12	0,11	0,04	5,0	8720	9630	0,673
IV 1975 г.	0,3	81,8	9,0	2,8	0,32	0,55	0,11	0,10	0,03	5,0	8740	9650	0,677
V 1975 г.	0,2	86,8	8,5	2,9	0,33	0,54	0,11	0,09	0,02	5,1	9080	10 030	0,684
VIII 1975 г.	0,3	81,8	8,8	2,8	0,34	0,57	0,14	0,12	0,04	5,1	8740	9650	0,673

Key: (a) Date of Analysis [Month indicated by Roman numeral];
(b) Percentage Content of Components;
(c) Heat of Burning, gcal/m^3;
(d) Lowest;
(e) Highest;
(f) Density Relative to Air.

The Layavozhskoye Despoit

This is a gas condensate deposit located 90 kilometers east of the city of Nar'yan-Mar within the Denisovka basin. It occurs in a brachyanticlinal fold.

Two gas pools have been identified at the deposit in beds of the Lower Permian and Carboniferous. The upper pool is confined to porous limestones of the Assel'skiy and Sakmarskiy stages of the Lower Permian.

The pool is an arching layered type. The second gas pool occurs in the carbonate complex of the Lower Permian. The layer pressure is 253 kilogram-force per square centimeter and the temperature is 62 degrees C.

The gases of the Layavozhskoye deposit have a high content of nitrogen, as much as 13 percent, and many fewer homologues of methane than the gases of the Vuktyl'skoye deposit. The composition of this deposit's gas, taken for well No 154, is as follows (in percentage): CH_4 -- 81.2; C_2H_6 -- 3.5; C_3H_8 -- 1.1; $i\text{-}C_4H_{10}$ -- 0.15; $n\text{-}C_4H_{10}$ -- 0.30; $i\text{-}C_5H_{12}$ -- 0.10; $n\text{-}C_5H_{12}$ -- 0.09; C_6H_{14} and higher -- 0.3; N_2 -- 13.0; CO_2 -- 0.3.

The Vaneyvisskoye Deposit

This deposit is 70 kilometers northeast of the city of Nar'yan-Mar, in a brachyanticlinal fold. The gas pool at the deposit occurs in beds of the Lower Permian and Upper Carboniferous. The gas lies at a depth of 2,175-2,375 meters with a layer pressure of 245 kilogram-force per square centimeter. It is a gas condensate pool; the layer gas contains about 57 grams of hydrocarbon condensate per cubic meter.

Gas from the Vaneyvisskoye deposit contains hydrogen sulfide, about 0.25 percent, and 1.7 percent carbon dioxide.

The relatively high hydrogen sulfide content in Vaneyvisskoye gases, exceeding the allowable norm set by the sectorial standard for natural gas being transported by trunk pipelines by a factor of more than 100, makes its development problematic and contingent on construction of sulfur scrubbing units.

The percentage composition of gas from the Vaneyvisskoye deposit can be described by the following figures:

CH_4 -- 90.2	$i\text{-}C_4H_{10}$ -- 0.1	N_2 -- 4.0
C_2H_6 -- 2.5	$n\text{-}C_4H_{10}$ -- 0.2	CO_2 -- 1.7
C_3H_8 -- 0.8	C_5H_{12} + higher -- 0.5	H_2S per 100 m^3 -- 360 g.

The density of the gas relative to air is 0.624 and its lowest heat of burning is 7,990 gigacalories per cubic meter.

The Kumzhinskoye Deposit

This deposit is located 80 kilometers northeast of the city of Nar'yan-Mar, in a narrow anticlinal fold. It is an arching, layered pool at a depth of

2,350 meters. The layer pressure of the pool is 260 kilogram-force per square centimeter. The pool is confined to porous carbonate rocks of the Lower Permian and Upper Carboniferous.

Like the gases of the Vaneyvisskoye deposit, the gases of the Kumzhinskoye deposit contain hydrogen sulfide (0.1-0.2 percent) and 3.5 percent carbon dioxide.

The hydrocarbon composition of gas from well No 1 of the Kumzhinskoye deposit, shown below in percentages, is close to that of the Vaneyvisskoye deposit:

CH_4 -- 90.2	$n\text{-}C_4H_{10}$ -- 0.25	N_2 -- 3.2
C_2H_6 -- 1.5	$i\text{-}C_5H_{12}$ -- 0.10	CO_2 -- 3.5
C_3H_8 -- 0.6	$n\text{-}C_5H_{12}$ -- 0.12	H_2S -- 320 g.
$i\text{-}C_4H_{10}$ -- 0.15	C_6 + higher -- 0.4	

The gas has a density of 0.637 relative to air and its lowest heat of burning is 7,890 gigacalories per cubic meter.

The Pechorogorodskoye Deposit

This deposit sits on the floodplain of the Pechora River near the settlement of Krasnyy Yar. It is confined to an anticlinal fold with a westerly strike.

Gas occurs in beds of the Lower Carboniferous and Upper Permian at the deposit. The productive horizons of the Lower Carboniferous (Yasnopolyanskiye beds) lie at a depth of 1,060-1,070 meters and have a layer pressure of 112 kilogram-force per square centimeter.

The gas in the Upper Permian beds lies at a depth of 440-450 meters with a layer pressure of about 58 kilogram-force per square centimeter.

The composition of the gas of the Lower Carboniferous pool is close to the composition of gases from the Vyktyl'skoye deposit with high levels of ethane (about nine percent), propane (up to four percent), and butane and higher forms (up to two percent).

The gases contain about eight percent nitrogen and 0.2 percent carbon dioxide.

The gases from the Upper Permian beds belong to the methane type with a low content of methane homologues (see Table 9 below).

Table 9. Description of the Gases of the Pechorogorodskoye Deposit

Components (%)	A	B	Components (%)	A	B
Methane	94.1	75.8	iso-Butane	0.03	0.53
Ethane	0.3	9.5	n-Butane	0.02	0.89
Propane	0.15	3.9	iso-Pentane	0.06	0.20

[Table continued, next page]

A -- Upper Permian, 490-500 meters; B -- Lower Carboniferous, 3,248-3,065 meters.

[Table 9, continued]

Component	A	B
n-Pentane	0.04	0.18
Hexane + higher	<0.1	0.2
Nitrogen	5.0	8.6
CO_2	0.2	0.2
Density Relative to Air	0.580	0.713
Lowest Heat of Burning, gcal/m^3	7,680	8,830

The Pechorokozhvinskoye Deposit

This deposit is located 14 kilometers north of the city of Pechora and is confined to an uplift which is a northwesterly-striking brachyanticlinal fold.

Upper Permian sandstones are the gas-containing rocks at the deposit. Pools of gas have been identified at a depth of 500-620 meters.

By composition the gases from this deposit are classified as methane with a small amount of methane homologues (see Table 10 below).

Table 10. Description of the Gas of the Pechorokozhvinskoye Deposit (by Individual Wells)

Index	Depth, meters		Index	Depth	
	522-544	530-620		522-544	530-620
Percent of Components					
Methane	92.6	95.3	Hexane + higher	<0.1	<0.1
Ethane	1.44	0.6	Nitrogen	5.3	3.4
Propane	0.13	0.2	CO_2	0.3	0.3
iso-Butane	0.05	0.06	Heat of Burning, Lowest gcal/m^3	7,710	7,820
n-Butane	0.06	0.05			
iso-Pentane	0.02	0.02	Density	0.588	0.577
n-Pentane	0.01	0.01			

The Nibel' Deposit

This deposit is located 120 kilometers northwest of the city of Ukhta and is confined to an uplift that is a large, asymmetric northwesterly-striking brachyanticlinal fold. It is a petroleum-gas deposit.

Industrially feasible petroleum-gas presence at the deposit is associated with Devonian beds, in whose productive stratum layers III, Iv, Ib, and Ia are singled out.

The principal gas pool is confined to layers III and Ib. Layers Ia and Ib contained petroleum and gas but are now depleted. The gas pools of layers III and Ib are near exhaustion.

The composition of the gases from the deposit changed as it was worked and the layer pressures declined.

A comparative assessment of the composition of gases from the gas pools of the Nibel' deposit in the initial stage of exploitation and during the period of declining extraction is shown in Table 11 (next page).

The Nyamedskoye Deposit

This is a gas deposit located 55 kilometers southeast of the city of Ukhta, confined to an anticlinal fold. Industrially feasible gas presence is found in the Pashiyskiye strata of the Zhivetskiy Stage of the Devonian: productive layer IIa and a small localized pool in layer III.

The layer lies at a depth of 690-710 meters. The gases of the Nyamedskoye deposit have small amounts of methane homologues and carbon dioxide, a large amount of nitrogen (up to eight percent), and no hydrogen sulfide.

The gas of this deposit is homogeneous within the confines of the deposit and has changed little during the process of exploitation (see Table 12 below).

Table 12. Description of Gas from the Nyamedskoye Deposit

Показатели (a)	Пласт II, скв. 2 (b)	Пласт II, скв. 13 (c)	Пласты Ia+Ib+II, скв. 2÷13 (d)	Пласт III (e)
(f) Содержание компонентов, %				
(g) Метан	92,1	91,3	89,9	92,6
(h) Этан	0,38	0,33	0,52	0,45
(i) Пропан	0,02	0,08	0,05	0,07
(j) изо-Бутан	0,01	0,01	0,03	0,04
(k) н-Бутан	0,06	0,02	0,02	0,03
(l) Пентан + высшие	0,03	0,02	0,03	0,05
(m) Азот	7,0	8,0	9,2	6,5
(n) Двуокись углерода, %	0,12	0,20	0,19	0,2
(o) Плотность по воздуху	0,586	0,591	0,[illegible]90	0,585
(p) Теплота сгорания низшая, ккал/м³	7450	7370	7290	7520

Key: (a) Indexes;
(b) Layer II, Well 2;
(c) Layer II, Well 13;
(d) Layers Ia+Ib+II, Wells 2+13;
(e) Layer III;
(f) Components (%);
(g) Methane;
(h) Ethane;
(i) Propane;
(j) iso-Butane;
(k) n-Butane;
(l) Pentane and Higher;
(m) Nitrogen;
(n) Carbon Dioxide;
(o) Density Relative to Air;
(p) Heat of Burning, Lowest, gcal/m^3.

Table 11. Composition of Gases of Nibel' Deposit (in %)

Номер скважины (Well Number)	Date	CO_2	CH_4	C_2H_6	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	i-C_5H_{12}	n-C_5H_{12}	C_6+higher	N_2
					Пласт Ib (Layer Ib)						
16	1950	0,1	84,8	3,6	1,3	0,15	0,20	0,07	0,05	0,1	9,5
16	1951	0,1	84,8	3,6	1,3	0,14	0,21	0,07	0,06	0,1	9,5
72	1952	0,1	84,4	3,5	1,4	0,16	0,23	0,10	0,07	0,1	9,8
16	1965	0,1	83,4	4,3	1,7	0,22	0,38	0,11	0,08	0,2	9,5
72	1965	0,1	82,9	4,3	1,8	0,27	0,43	0,16	0,12	0,2	9,7
111	1969	0,24	82,2	5,5	2,7	0,46	0,84	0,29	0,24	0,2	7,2
					Пласт III (Layer III)						
36	1951	0,1	87,4	1,17	0,14	0,03	0,02	0,02	0,02	0,1	11,0
59	1951	0,1	87,6	1,20	0,15	0,03	0,02	0,02	0,02	0,1	10,8
99	1953	0,1	87,4	1,00	0,13	0,03	0,02	0,02	0,01	0,1	11,2
59	1965	0,1	86,1	1,20	0,15	0,05	0,02	0,02	0,02	0,1	12,2
38	1965	0,1	86,3	1,40	0,17	0,06	0,03	0,02	0,02	0,1	11,8
8	1969	0,1	86,0	1,40	0,27	0,07	0,04	0,01	0,01	0,1	12,0
53	1970	0,12	88,6	1,90	0,10	0,02	0,01	0,01	0,01	0,1	9,1
61	1970	0,35	79,6	2,90	0,60	0,10	0,12	0,02	0,01	0,1	16,2
78	1970	0,4	78,5	3,30	0,90	0,13	0,20	0,04	0,04	0,1	16,5
			78,4	5,50	2,0	0,29	0,54	0,12	0,12	0,1	12,9

The Sed'-Iol'skoye Deposit

This is a multilayered gas deposit located 90 kilometers southeast of the city of Ukhta in a northwesterly-striking brachyanticlinal fold.

Devonian beds at the deposit contain the gas. Pools have been identified in the Eifelian Stage (layer III), and the Zhivetskiy (layer IIa) and Pashiyskiye strata (layers Ia and Ib). The productive pools occur at a depth of 680-740 meters. Layer III is the primary gas-bearing layer of the deposit. The total thickness of the gas-bearing layers is about 20 meters. The productive layers have been worked as one unit. The gas from the Sed'-Iol'skoye deposit has a methane composition with increased amounts of nitrogen (about nine percent) and helium. The gas has no hydrogen sulfide and low levels of CO_2 (0.1 percent) and methane homologues.

The composition of the gas is homogeneous at wells within the pools and changes little in the cross-section of productive horizons. It can be described by the analyses given in Table 13 below.

Table 13. Description of the Gases of the Sed'-Iol'skoye Deposit (at the Beginning of Exploitation of the Pools)

(a) Показатели	(b) Пласты				(c) Средние по месторождению
	Ia	Ib	IIa	III	
(d) Содержание компонентов, %					
(e) Метан	86,2	87,5	89,0	89,4	88,9
(f) Этан	2,3	2,2	1,3	1,1	1,2
(g) Пропан	1,0	0,9	0,4	0,15	0,4
(h) изо-Бутан	0,17	0,15	0,14	0,05	0,01
(i) н-Бутан	0,13	0,12	0,06	0,02	0,05
(j) изо-Пентан	0,03	0,03	0,01	0,02	0,02
(k) н-Пентан	0,02	0,02	0,01	0,01	0,02
(l) Азот	10,0	9,0	9,0	9,1	9,2
(m) Углекислый газ	0,1	0,1	0,1	0,1	0,1
(n) Плотность по воздуху	0,625	0,617	0,606	0,602	0,603
(o) Теплота сгорания низшая, ккал/м³	7530	7390	7440	7380	7390

Key: (a) Indexes; (b) Layers; (c) Average for Deposit; (d) Components (%); (e) Methane; (f) Ethane; (g) Propane; (h) iso-Butane; (i) n-Butane; (j) iso-Pentane; (k) n-Pentane; (l) Nitrogen; (m) Carbon Dioxide; (n) Density Relative to Air; (o) Lowest Heat of Burning, in gcal/m^3.

The Kush-Kodshskoye Deposit

This is a gas deposit located 23 kilometers northwest of the city of Ukhta and confined to a dome-like fold that is slightly elongated in a northwesterly direction. The Zhiveyskiy Stage (layer IIa) and the Pashiyskiye strata (layer Ib) have industrially feasible gas. The productive layers

lie at depths of 640-776 meters. The initial layer pressure in pool IIa was 67 kilogram-force per square centimeter; in the pool of layer Ib it was 50. The deposit was worked with a limited number of wells (see Table 14 below).

Table 14. Description of the Gas of the Kush-Kodshskoye Deposit

Показатели (a)	Пласт Ib (b)	Пласт II (c)	Средний состав добываемого газа (d)
(e) Содержание компонентов, %			
(f) Метан	91,0	92,4	91,8
(g) Этан	0,30	0,34	0,6
(h) Пропан	0,12	0,06	0,07
(i) изо-Бутан	0,04	0,03	0,04
(j) н-Бутан	0,02	0,01	0,03
(k) Пентан + высшие	0,05	0,04	0,02
(l) Азот	7,5	7,0	7,2
(m) Углекислый газ	0,1	0,1	0,19
(n) Плотность по воздуху	0,591	0,586	0,589
(o) Теплота сгорания низшая, ккал/м³	7450	7470	7460

Key: (a) Indexes;
(b) Layer Ib;
(c) Layer II;
(d) Average Composition of Gas Extracted;
(e) Components (%);
(f) Methane;
(g) Ethane;
(h) Propane;
(i) iso-Butane;
(j) n-Butane;
(k) Pentane and Higher;
(l) Nitrogen;
(m) Carbon Dioxide;
(n) Density Relative to Air;
(o) Heat of Burning, Lowest, in gcal/m^3.

The Voy-Vozh Deposit

This petroleum-gas deposit is situated 122 kilometers southeast of the city of Ukhta. It occurs in a brachyanticlinal fold on the northeastern slope of the Southern Timan. Industrially feasible gas is found in Devonian beds; within their cross-section the Pashiyskiye strata (layers Ia and Ib), the Zhivetskiye strata (layer Ig), and the Eifelian Stage (layer III) are productive.

The pools of layers Ia and Ia and Ig are petroleum-gas pools, whereas the pool of layer III is a gas pool lying at a depth of 710-780 meters. The initial layer pressure was 65 kilogram-force per square centimeter. The main gas reserves of the Voy-Vozh deposit have been identified in the pool of layer III. The compositionsof the gases from the gas and petroleum-gas pools of the Voy-Vozh deposit differ chiefly in content of homologues of methane.

In the lowest pool, the gas pool of horizon III, the total content of methane homologues is no more than 1.5 percent, with somewhat more nitrogen and helium.

As layer pressures declined in the process of working the deposit the molecular mass of the gas was increased by the growing weight of its hydrocarbon content. Table 15 gives a description of the composition of the gases of the Voy-Vozh deposit in the initial period of exploitation of the deposit. The composition of gas extracted at the deposit in the final stage of its processing appears in the last column of Table 15.

Table 15. Description of the gas of the Voy-Vozh Deposit

Компоненты (a)	(b) Пласты			(c) Средний состав добываемого газа. Анализ на газопровода
	Ia, 650—670 м	Iб, 660—710 м	III, 710—780 м	
(d) Содержание компонентов, %				
(e) Метан	83,7	82,4	88,1	84,4
(f) Этан	3,5	3,4	1,0	5,2
(g) Пропан	1,5	1,3	0,15	1,3
(h) изо-Бутан	0,4	0,4	0,04	0,10
(i) н-Бутан	0,7	0,6	0,02	0,24
(j) Пентан + высшие	0,6	0,5	0,05	0,15
(k) Азот	9,5	9,5	10,5	8,2
(l) Углекислый газ	0,1	0,1	0,1	0,18
(m) Плотность по воздуху	0,659	0,652	0,609	0,639
(n) Теплота сгорания низшая, ккал/м³	8020	7870	7250	7930

Key: (a) Components [sic];
(b) Layers;
(c) Average Composition of Gas Extracted, Analysis from Pipeline;
(d) Percentage of Components;
(e) Methane;
(f) Ethane;
(g) Propane;
(h) iso-Butane;
(i) n-Butane;
(j) Pentane and Higher;
(k) Nitrogen;
(l) Carbon Dioxide;
(m) Density Relative to Air;
(n) Lowest Heat of Burning, in gcal/m^3.

The Nizhneomrinskoye Deposit

This petroleum-gas deposit is located 140 kilometers southeast of the city of Ukhta. It is a large ridge-like structure with a latitudinal strike.

Industrially feasible petroleum and gas is confined to the Pashiyskiye strata of the Nizhnefranskiy Stage (layers Ia and Ib) and the Nadcheb'yusskiye (layer Iv) and Nizhnecheb'yusskiye (layer III) strata of the Middle Devonian lying at depths of 910-1,100 meters.

The chief gas pools are in layers Ia and Ib.

The petroleum-gas pools have thick gas caps. Layer Iv has a gas pool with a petroleum fringe.

The composition of the gases from the gas and petroleum-gas pools of the Nizhneomrinskoye deposit in the initial and final stages of exploitation is shown in Table 16 below.

Table 16. Composition (%) of Gases of the Nizhneomrinskoye Deposit

Компоненты(a)	(b) Пласты			
	I-а, 900—920 м	I-б, 920—940 м	I-в, (Iv) 949/952 м	III, 1050—1150 м
(c) Начальный период разработки				
Метан (e)	93,0	84,3	83,9	84,4
Этан (f)	4,5	4,5	3,5	3,2
Пропан (g)	1,8	1,5	1,0	0,9
изо-Бутан (h)	0,3	0,3	0,2	0,3
н-Бутан (i)	0,5	0,5	0,1	0,4
Пентан + высшие (j)	0,3	0,2	0,1	0,21
Азот (k)	9,5	8,6	11,0	10,5
Углекислый газ (l)	0,1	0,1	0,2	0,1
(d) Конечный период разработки				
Метан (e)	82,8	85,0	85,2	83,7
Этан (f)	5,4	5,6	5,1	4,9
Пропан (g)	2,5	1,3	1,2	1,3
изо-Бутан (h)	0,45	0,20	0,22	0,25
н-Бутан (i)	0,70	0,35	0,12	0,68
Пентан + высшие (j)	0,18	0,3	0.3	0,9
Азот (k)	7,8	7,0	7,6	8,0
Углекислый газ (l)	0,18	0,20	0,21	0,24

Key: (a) Components;
(b) Layers;
(c) Initial Stage of Work;
(d) Final Stage of Work;
(e) Methane;
(f) Ethane;
(g) Propane;
(h) iso-Butane;
(i) n-Butane;
(j) Pentane and higher;
(k) Nitrogen;
(l) CO_2.

The Zapadno-Iskos'gorskoye Deposit

This deposit is in the southeastern part of the Ukhta administrative region 20 kilometers from the settlement of Voy-Vozh. It occurs in a group of dome-like uplifts.

The industrially productive beds at the deposit are Middle Devonian. Gas pools have been identified in the Eifelian (layer III) and Zhivetskiy (layer II) stages. The chief gas reserves are in layer III, where a minor petroleum fringe has also been established. The gas pool of layer II is a narrow strip with small reserves.

The gases of the Zapadno-Iskos'gorskoye deposit are classified as the methane type. They have a high content of nitrogen (up to 10 percent) and relatively small concentrations of ethane (about one percent) and its homologues. The compositions of the gases of the main pool of layer III are shown in Table 17 below.

Table 17. The Composition (%) of Gases from the Zapadno-Iskos'gorskoye Deposit (Layer III)

Номер скважины (Well No.)	CO_2	CH_4	C_2H_6	C_3H_8	$i\text{-}C_4H_{10}$	$n\text{-}C_4H_{10}$	C_5+высшие (C_5+higher)	N_2
12	0,1	87,9	1,0	0,20	0,05	0,04	0,1	10,5
20	0,1	89,1	0,9	0,20	0,03	0,02	0,1	9,5
28	0,1	88,1	1,2	0,39	0,05	0,04	0,1	10,0
29	0,2	87,5	1,0	0,40	0,05	0,04	0,1	10,7
29	0,2	88,4	1,1	0,36	0,08	0,06	0,1	9,7
12	0,2	89,3	1,0	0,30	0,06	0,05	0,1	9,0
20	0,3	90,3	1,0	0,20	0,05	0,04	0,1	8,0
28	0,1	88,4	1,0	0,27	0,08	0,05	0,1	10,0
9	0,1	88,7	1,0	0,26	0,06	0,05	0,1	9,7
20	0,1	91,8	1,3	0,18	0,05	0,05	0,1	6,4

The Rassokhinskoye, Kur'inskoye, and Pachginskoye deposits have been explored in the southern part of the Upper Pechora basin, 200 kilometers south of Vuktyl, near the settlement of Kur'ya.

The Rassokhinskoye gas deposit occurs in an anticlinal fold adjoining the Kur'inskoye uplift. Presence of gas there has been established in beds of the Lower Permian and Carboniferous.

The Kur'inskoye gas deposit is confined to an anticlinal fold. At it too the gas-bearing beds are from the Lower Permian and Carboniferous.

The Pachginskoye gas deposit is 10 kilometers northeast of the Kur'inskoye deposit. Once again, the Lower Permian and Carboniferous beds contain the gas.

The hydrocarbon composition of the gases of the Rassokhinskoye, Kur'inskoye, and Pachginskoye deposits is fairly similar; they have a high content of ethane (about six percent),and propane (1.5 percent) and a small amount of carbon dioxide (about 0.1 percent).

The composition of gases from these deposits can be evaluated with the data given in Table 18 (next page).

Table 18. Composition (%) of Gases from Pools in the Lower Permian Beds of a Series of Deposits

(a) Компоненты	(b) Рассохинское	(c) Курьинское	(d) Пачгинское
Метан (e)	76,5	87,7	86,8
Этан (f)	6,5	4,8	6,3
Пропан (g)	1,6	1,3	1,5
изо-Бутан (h)	0,23	0,20	0,21
н-Бутан (i)	0,30	0,31	0,33
изо-Пентан (j)	0,15	0,08	0,11
н-Пентан (k)	0,11	0,05	0,10
Гексан + высшие (l)	0,2	0,1	0,1
Азот (m)	14,0	5,4	4,5
Углекислота (n)	0,18	0,11	0,10

Key: (a) Components; (h) iso-Butane;
(b) Rossokhinskoye; (i) n-Butane;
(c) Kur'inskoye; (j) iso-Pentane;
(d) Pachginskoye; (k) n-Pentane;
(e) Methane; (l) Hexane and Higher;
(f) Ethane; (m) Nitrogen;
(g) Propane; (n) CO_2.

The Deposits of Western Siberia

Gas, gas condensate, petroleum-gas, and petroleum deposits have been discovered in Western Siberia, in Tyumenskaya, Tomskaya, and Novosibirskaya oblasts and Krasnoyarskiy Kray. They are located within the Western Siberian lowland, an enormous bowl-shaped basin bounded by folded formations on the west, east, and south and running to the Arctic Ocean region in the north.

This region encompasses the vast territory from the eastern spurs of the Ural Range in the west to the Yenisey River in the east, from the shores of the Arctic Ocean in the north to the folded formations of Kazakhstan and the Altay in the south.

The primary petroleum and gas presence in this region occurs in Mesozoic beds; seven petroleum-gas strata are identified in the cross-section.

The Lower and Middle Jurassic petroleum-gas stratum lies at the base of the Mesozoic-Cenozoic platform mantle of the Western Siberian platform plate, unconformably and showing erosion, covering the basement formations and intermediate complex.

The stratum has an alternation of argillites, aleurolites, and sandstones that accumulated under conditions of fresh-water, seacoast, and marine facies. The seacoast and marine facies are developed only in the top parts of the stratum in the central regions and through almost the entire cross-section of the northern and northeastern regions.

The Upper Jurassic petroleum-gas stratum lies comformably on Middle Jurassic rocks in the eastern and southern parts of the lowland, but there is a small interruption in sediment accumulation in the rest of the region.

The stratum consists of marine argillites in the western half of the lowland and seacoast sandstones in the eastern part. The southern part has multicolored lagoon sediments, primarily argillaceous. The stratum tends to be thicker toward the margins of the lowland and toward the northeast. In the northern half of the lowland the beds are marine and seacoast argillaceous rocks with sandstone interlayers.

The permeable rocks in the Upper Jurassic beds, with the exception of the northern and northeastern regions, are hydrodynamically connected to the underlying Middle Jurassic sediments.

The Lower and Middle Valanginian petroleum-gas stratum lies conformably on Upper Jurassic beds. The stratum is composed principally of marine argillaceous rocks. Sand layers are found in some places. The thickness of the Lower and Middle Valanginian beds increases gradually as one moves from the margins of the lowland toward the center.

The Upper Valanginian petroleum-gas stratum lies conformably on Middle Valanginian rocks everywhere in the lowland except the southeastern part. This stratum is composed of marine beds in the southern regions, primarily sand beds, and of argillaceous beds in the west. The thickness of the stratum increases as one moves from the margins toward the center and also in the northern part of the lowland.

The Goteriv-Barremian and, in part, Aptian petroleum-gas strata lie on top Valanginian rocks. The beds are composed of sandstones, aleurolites, and clays. In the southern and southeastern regions of the lowland multicolored sand-clay sediments are developed, while marine argillaceous rocks occur in the western part. The thickness of the beds increases as one moves from the periphery toward the center of the lowland.

The Aptian-Albian-Cenomanian petroleum-gas stratum lies conformably on the beds below it. It is composed of an alternation of clays, aleurolites, and sandstones with the last-named predominating. Continental and seacoast sediments of the Pokurskaya Series occur over most of the territory, changing to multicolored beds in the south and replaced by marine and seacoast sediments in the west. The thickness of the stratum increases as one moves from the periphery toward the center.

The Upper Cretaceous (without the Cenomanian) petroleum-gas stratum lies conformably on Aptian-Albian-Cenomanian sediments and is composed of argillaceous and siliceous-argillaceous rocks. Sandy varieties appear in the eastern and southern regions. The thickness of the stratum increases as one moves from the margins toward the center of the lowland.

Structural uplifts are extensively developed throughout the platform. The density of large structural uplifts increases toward the center of the platform and in the northern regions.

In terms of composition, the natural gases of the Western Siberian deposits are heterogeneous and differ by content of hydrocarbons, nitrogen and CO_2 as well as by gas condensate characteristics.

These differences appear especially significantly on a regional scale and in the cross-section of productive horizons at the deposits. Based on the territorial arrangement of deposits and their characteristics, the deposits that have been discovered form the northern region and the western region.

1. The Northern Gas Region

This region encompasses the vast territory between the Nadym and Taz rivers and in the Yenisey-Khatanga trough. The region is bounded on the south by the 63rd parallel; on the west its boundaries are the eastern spurs of the Ural Range north of the city of Salekharda and follow the Ob' River to the south. The region stretches to the Khatanga River in the east.

This region includes the main, largest gas deposits and gas condensate pools.

The industrially feasible gas presence of the region is associated with Cretaceous and Jurassic beds. The chief productive beds of the Cretaceous are the Cenomanian (Upper Cretaceous) and Valanginian (Lower Cretaceous).

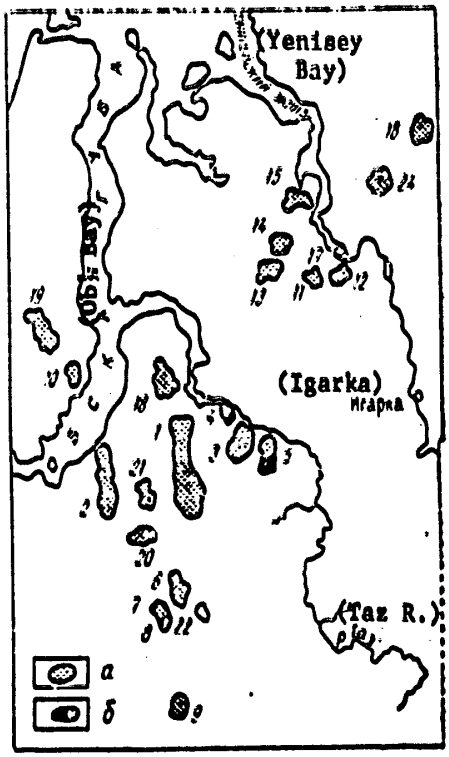
The following are the principal deposits that have been explored in the Northern Gas Region: Urengoyskoye, Medvezh'ye, Zapolyarnoye, Tazovskoye, Russkoye, Gubkinskoye, Komsomol'skoye, Pyakopurovskoye, Vyngapurskoye, Novoportovskoye, Messoyakhskoye, Zimneye, Soleninskoye, Pelyatkinskoye, Kazantsevskoye, Dzhangotskoye, Nizhnekhetskoye, Yamburgskoye, Arkticheskoye, Yamsoveyskoye, Yubileynoye, and Ayvasedopurovskoye, as well as others (see Figure 2, next page).

The Urengoyskoye Deposit.

This deposit was discovered in 1966. It occurs in a north-south striking brachyanticlinal fold. The main gas pool lies in Cenomanian beds (Upper Cretaceous) and is confined to the upper part of the sand-clay stratum, which is composed of sandstones and aleurolites intricately interlayered with clays. The pool is covered by regionally persistent beds, mainly argillaceous, which are 550-670 meters thick over the deposit.

The gas pool is an arching, layered massive type; it is a floating pool with a water pressure system. The layer pressure of the pool is 122.5

Figure 2. Map of the Locations of the Gas Deposits of the Northern Gas Region of Western Siberia



Key: (a) Gas;
(b) Petroleum-Gas;
(1) Urengoyskoye
(2) Medvezh'ye;
(3) Zapolyarnoye;
(4) Tazovskoye;
(5) Russkoye;
(6) Gubkinskoye;
(7) Komsomol'skoye;
(8) Pyakopurovskoye;
(9) Vyngapurovskoye;
(10) Novoportovskoye;
(11) Messoyakhskoye;
(12) Zimneye;
(13) Soleninskoye;
(14) Pelyatkinskoye;
(15) Kazantsevskoye;
(16) Dzhangotskoye;
(17) Nizhnekhetskoye;
(18) Yamburgskoye;
(19) Arkticheskoye;
(20) Yamsoveyskoye;
(21) Yubileynoye;
(22) Ayvasedopurovskoye;
(23) Punginskoye;
(24) Ozernoye.

kilogram-force per square centimeter. The temperature of the layer ranges from 27 degrees C. in the upper part of the pool to 34 degrees C. at the water-gas contact.

The gases of the Cenomanian pool of the Urengoyskoye deposit are classed as methane type with a low concentration of methane homologues, ranging from 0.02 to 0.5 percent through the area and cross-section of the productive layer. The lowest proportion of methane homologues is observed in the upper pockets of the Cenomanian pool and its uplifted domed parts, as well as in the water-gas contact zones. The concentration of heavy hydrocarbons increases toward the bottom of the pool and along the strike of the structure, from the southern zone where the content of heavy hydrocarbons is no more than 0.11 percent to the northern zone where there are significant variations in concentration among different wells and the proportion reaches 0.5 percent.

This pattern appears to be related to the general tilt of the productive layers and water-gas contact toward the northeast; it indicates the direction of gas filtration during formation of the pool.

The nitrogen content of gases from the Cenomanian pool varies by wells and sectors from 0.6 to 3.7 percent. The highest concentrations of nitrogen are found in wells in marginal parts of the structure and in the water-gas contact zones.

Gases from the Cenomanian pool of the Urengoyskoye deposit can be transported along trunk pipelines without preliminary removal of heavy hydrocarbons. During industrial processing moisture is removed from the gas and small amounts (0.3 grams per cubic meter) of heavy hydrocarbons with boiling points of up to 300 degrees C. are separated out (see Table 19, next page).

In addition to pools in Cenomanian beds the Urengoy region has productive horizons in Lower Cretaceous (Valanginian) and Jurassic beds (see Table 20, page after next).

In terms of chemical composition, the Valanginian and Jurassic gases differ significantly from the Cenomanian gases. The chief difference is content of heavy hydrocarbons, whose concentrations increase at depth.

The gases contain gas condensate fractions and high levels of ethane, propane, and butane which must be extracted before feeding to the pipeline. The hydrocarbons that are removed find use as raw material for the production of special-purpose products and in the petrochemical industry.

The Medvezh'ye Deposit

The Medvezh'ye gas deposit is a three-domed structure within the Nenets arch, which extends in a SSW-NNE direction.

The pool is 125 kilometers long and 13-29 kilometers in width.

The Medvezh'ye-Nydinskaya fold is composed of two local uplifts, the northern or Nydinskoye and the southern or Medvezh'ye, which are divided by a saddle. In its turn, the Medvezh'ye uplift has three smaller structural features.

The Nydinskoye uplift is 33 kilometers long and 19 wide; the Medvezh'ye has a length of 86 kilometers and a width of 26.

In geological structure and trap characteristics the Medvezh'ye deposit is similar to the Urengoyskoye deposit 125 kilometers away.

The Medvezh'ye deposit was put into experimental industrial operations in 1972. The Cenomanian beds contain industrially feasible gas. They are capped by thick (600-650 meters) beds of Turonian-Paleogenic clays. The Cenomanian gas pool is an arched, layered massive pool underlain by water. The depth of the roof of the Cenomanian gas pool in the arched part is 1,060-1,210 meters. The gas layer ranges in thickness from 135

Table 19. Description of the Gas from the Upper Cretaceous Beds of the Urengoyskoye Deposit (Cenomanian Pool)

Номер скважины (a)	Глубина, м (b)	(c) Содержание компонентов, %							(d) Плотность по воздуху	Теплота сгорания, (e) ккал/м³	
		CO_2	CH_4	C_2H_6	C_3H_8	C_4H_{10}	C_5H_{12}	C_6+ высшие	N_2	низшая (f)	высшая (g)
Южная зона (Southern Zone)											
47	1243—1237	0,49	95,8	0,09	0,005	0,001	<0,01	<0,01	3,4	0,574	7680	8490
1	1238—1246	1,20	95,7	0,07	0,004	0,001	<0,01	<0,01	1,7	0,573	7730	8590
30	1234—1240	0,29	98,8	0,07	0,003	<0,001	<0,01	<0,01	0,8	0,560	7900	8750
5		0,30	96,9	0,07	0,003	0,001	<0,01	<0,01	2,8	0,565	7750	8610
4	1243—1247	0,18	98,7	0,10	0,005	0,001	<0,01	<0,01	1,0	0,560	7880	8750
6	1233—1253	0,27	98,9	0,01	0,001	<0,001	<0,01	<0,01	0,8	0,560	7910	8770
9	1250—1290	0,14	98,6	0,10	0,005	0,001	<0,01	<0,01	1,1	0,561	7900	8770
2	1148—1153	0,20	98,4	0,01	0,002	0,002	<0,001	<0,001	1,2	0,561	7860	8730
Северная зона (Northern Zone)											
16	—	0,20	98,0	0,12	0,001	0,001	0,01	0,01	1,6	0,561	7840	8720
28	1158—1160	0,50	96,0	0,21	0,01	0,007	0,01	0,01	2,6	0,562	7890	8760
37	1212—1217	0,02	99,3	0,06	0,001	<0,001	0,01	0,01	0,6	0,560	7930	8820
38	1222—1230	0,02	99,3	0,09	0,001	<0,001	0,01	0,01	0,6	0,560	7930	8820
39	1224—1230	0,70	95,8	0,09	0,01	0,002	0,01	0,01	3,4	0,574	7880	8750
40	1228—1236	0,13	96,1	0,48	0,001	0,001	0,01	0,01	3,2	0,572	7840	8710
54	1233—1238	0,36	97,9	0,13	0,003	0,001	0,01	0,01	1,5	0,565	7840	8710
61	1250—1256	1,50	95,4	0,11	0,012	0,005	0,01	0,01	2,9	0,581	7830	8700
71	1230—1233	0,01	97,3	0,06	0,01	0,002	0,01	0,01	2,5	0,566	7930	8820
8	1231—1240	0,50	97,5	0,16	0,009	0,002	0,01	0,01	1,8	0,568	7920	8800
63	1209—1215	0,40	97,1	0,03	0,007	0,001	<0,01	<0,01	1,5	0,561	7770	8630
24	1245—1250	0,02	98,3	0,10	0,001	0,001	0,01	0,01	1,5	0,559	7950	8830
32	1221	0,18	98,7	0,08	<0,002	<0,001	<0,01	<0,01	1,0	0,561	7900	8770

Key: (a) Well Number;
(b) Depth, meters;
(c) Components, percentage;
(d) Density Relative to Air;
(e) Heat of Burning, gigacalories per cubic meter;
(f) Lowest;
(g) Highest.

Table 20. Description of Gas from the Lower Cretaceous and Jurassic Beds of the Urengoyskoye Deposit

Глубина, м (a)	(b) Содержание компонентов, %										(c) Плотность по воздуху	(d) Теплота сгорания, ккал/м³	
	CO_2	CH_4	C_2H_6	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	i-C_5H_{12}	n-C_5H_{12}	C_6+Higher	N_2		низшая (e)	высшая (f)
(g) Нижнемеловые (валанжин) отложения													
2721—2730	0,48	83,2	6,4	3,9	1,22	1,06	0,33	0,24	0,2	2,5	0,687	9 280	10 240
2834—2862	0,33	92,5	2,0	0,66	0,29	0,21	0,09	0,05	0,1	3,7	0,603	8 040	8 910
2860—2875	0,63	95,1	1,5	0,20	0,03	0,02	—	—	0,1	2,2	0,583	7 910	8 770
(h) Юрские отложения													
3000—3020	0,26	88,1	4,3	1,8	0,45	0,62	0,26	0,27	0,3	3,6	0,647	8 630	9 540
3000—3030	0,27	90,9	3,5	1,7	0,37	0,49	0,19	0,18	0,2	0,2	0,630	8 850	9 790
3015—3030	0,12	87,0	6,2	3,4	0,88	1,1	0,3	0,26	0,2	1,1	0,677	9 390	10 340
3161—3170	0,12	54,9	13,2	4,8	3,7		4,8		2,0	1,64	0,946	10 730	11 750

Key: (a) Depth, meters;
(b) Components, percent;
(c) Density Relative to Air;
(d) Heat of Burning, giga-calories per cubic meter;
(e) Lowest;
(f) Highest;
(g) Lower Cretaceous (Valanginian) Beds;
(h) Jurassic Beds.

meters in the Medvezh'ye uplift and 114 meters in the Nydinskoye uplift to 21 meters in the bend between domes.

The productive beds are composed of intricately interlayered sandy, aleurolite, and clay rocks with a few limestone layers up to three meters thick.

The clay interlayers are 1-3 meters thick or more in several cases. The layer pressure is 117.5 kilogram-force per square centimeter and the temperature is 34-35 degrees C.

Several packets, differing by permeability, are provisionally identified in the productive cross-section. The first, upper packet lies at depths of 1,060-1,188 meters; it is 24-44 meters thick in the Nydinskoye uplift and 25-60 meters in the Medvezh'ye.

Two permeable layers up to 10 meters thick separated by a layer 1-2 meters thick are identified throughout the upper part of the packet. The lower part is composed of an alternation of sandy-aleurolite rocks and clays. The second packet, 24-33 meters thick, is composed mainly of aleurolites and sandy aleurolites with clay interlayers. The third packet is 27-41 meters thick and composed of the same rocks as the packets above it. The fourth packet is gas saturated only in the arch wells. The thickness of the opened part of the packet is 20-40 meters.

It has been established that the water-gas contact of the Cenomanian pool has a northeasterly tilt at depths of 1,165-1,200 meters. The water-bearing system, which encloses the gas pool, is 1,550 meters thick. Table 21 presents data on gas from the Cenomanian beds. In addition to the Cenomanian pool, gas and petroleum beds of the Valanginian (Lower Cretaceous) and Jurassic have been shown to be productive at the Urengoyskoye and Gubkinskoye deposits (see Table 22 below).

The productive cross-section of the Medvezh'ye deposit has an inconsistent structure caused by the complex interlayering of sandy aleurolite rocks and clays. In the upper horizons the clay interlayers account for 35-40 percent of the thickness; deeper down their proportion is less.

The gases from the Cenomanian pool are similar in composition to the gases from the Cenomanian pool at the Urengoyskoye deposit. They are methane gases with a low methane homologue content (see Table 19 above). At the same time, they contain small amounts of gas condensate fractions of high molecular mass. The quantity of gas condensate ranges from 0.3 to 0.5 cubic centimeters per cubic meter of gas. The end of boiling point of the condensate is about 300 degrees C.

The concentrations of nitrogen, carbon dioxide, and ethane vary at different wells over the vast area of the deposit.

Table 21. Description of Gas from the Medvezh'ye Deposit (Cenomanian Pool, Upper Cretaceous Beds)

(a) Номера скважин	Абсолютные отметки по кровле сеномана, м (b)	Интервал перфорации, м (c)	(d) Содержание компонентов, %							(e) Плотность по воздуху	Теплота сгорания, (f) ккал/м³	
			CO_2	CH_4	C_2H_6	C_3H_8	C_4H_{10}	C_5+ высшие	N_2		низшая (g)	высшая (h)
Ныдинская площадь (Nydinskaya Area)												
1	1139	1105—1159	0,06	99,1	0,08	0,005	0,005	0,01	0,07	0,560	7900	8810
3	1026	—	0,1	97,8	0,14	0,001	0,001	0,01	1,9	0,567	7840	8700
11	1132	1139—1155	0,02	99,1	0,10	0,006	0,002	<0,01	0,7	0,560	7920	8810
16	1054	1148—1176	0,08	99,1	0,08	0,011	0,02	0,02	0,7	0,559	7950	8810
19	1104	1127—1138	0,02	99,3	0,07	0,001	0,001	<0,01	0,6	0,559	7950	8820
22	1122	1151—1155	0,03	99,2	0,09	0,002	0,001	<0,01	0,64	0,558	7910	8820
12	1068	1128—1132	0,04	99,3	0,09	0,003	0,001	0,01	0,6	0,561	7920	8830
26	1130	1160—1165	0,02	99,3	0,08	0,001	<0,001	0,01	0,6	0,559	7930	8830
Площадь Медвежья (Medvezh'ya Area)												
14	1127	1156—1160	0,15	98,9	0,08	0,002	0,001	0,01	0,97	0,560	7840	8780
1	1032	—	0,13	98,4	0,10	0,001	0,002	0,01	1,4	0,560	7880	8750
13	1091	1176—1183	0,19	96,6	0,11	0,005	0,002	0,01	2,7	0,565	7680	8590
8	1038	1157—1169	0,4	98,1	0,10	0,003	0,001	0,01	1,3	0,566	7850	8720
4	1105	1175—1185	0,10	98,8	0,12	0,006	0,002	0,01	0,97	0,562	7940	8790
18	996	1058—1159	0,01	99,2	0,12	0,003	0,001	<0,01	0,64	0,558	7910	8820
21	1066	1127—1131	0,03	99,2	0,10	0,001	<0,001	<0,01	0,60	0,558	7930	8820
7	1054	1115—1121	0,11	97,8	0,25	0,002	<0,001	0,01	1,8	0,564	7730	8720
25	1125	1174—1178	0,04	98,2	1,32	0,020	0,008	0,01	0,4	0,563	8030	8930
16	1101	992—1000	0,3	97,2	0,09	0,002	0,001	0,01	2,4	0,570	7750	8640
16	—	1144—1158	0,13	97,5	0,77	0,006	0,002	0,01	1,4	0,561	7890	8770
10	1038	1068—1178	0,4	95,8	0,07	0,004	0,001	0,01	3,7	0,576	7600	8510

Key: (a) Well Number;
(b) Absolute Marker of Roof of Cenomanian, meters;
(c) Perforation Interval, meters;
(d) Components, percentage;
(e) Density Relative to Air;
(f) Heat of Burning, gigacalories per cubic meter;
(g) Lowest;
(h) Highest.

Table 22. Description of Gas from the Medvezh'ye Deposit (Valanginian Beds)

(a) Номер скважины	Интервал перфорации, м (b)	(c) Содержание компонентов, %: CO₂	CH_4	C_2H_6	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	i-C_5H_{12}	n-C_5H_{12}	C_6+higher	N₂	Плотность по воздуху (d)	Теплота сгорания, (e) ккал/м³: высшая (f)	низшая (g)
17	3063—3070	0,15	83,6	5,4	3,43	0,76	1,18	0,35	0,32	0,3	4,5	0,684	8 950	9 990
30	2059—2980	0,48	85,9	4,7	3,1	0,63	0,97	0,3	0,3	0,4	3,2	0,674	8 990	9 930
70	3140—3155	0,30	87,0	4,7	3,4	0,65	1,1	0,33	0,3	0,3	1,8	0,670	9 150	10 110
30	3220—3236	0,41	82,0	5,5	3,6	0,62	1,06	0,33	0,32	0,3	4,9	0,683	8 810	9 820
32	3249—3255	0,7	63,7	10,2	12,6	2,9	4,7	1,4	1,2	1,0	1,8	0,937	12 230	13 630
32	3649—3655	0,6	68,0	12,1	9,8	2,0	2,7	0,9	0,7	1,0	2,6	0,841	11 060	12 560

Key: (a) Well Number;
(b) Perforation Interval, meters;
(c) Components, percentage;
(d) Density Relative to Air;
(e) Heat of Burning, gigacalories per cubic meter;
(f) Lowest;
(g) Highest.

The lowest concentrations of CO_2 (up to 0.1 percent), nitrogen (0.7 percent), and ethane (0.1 percent) are found at the Nydinskaya area. At the Medvezh'ye area there is somewhat more CO_2 (up to 0.3 percent), nitrogen (3.7 percent), and heavy hydrocarbons (up to 1.3 percent).

The average composition of gases from the Cenomanian pool of the Nydinskoye uplift and the Medvezh'ye area is shown in Table 23 below.

Table 23. Description of Gases from the Medvezh'ye Deposit

Index	Nydinskaya	Medvezh'ye
Components (%)		
Methane	99.0	98.1
Ethane	0.10	0.20
Propane	0.004	0.004
Butanes	0.01	0.01
Pentane and Higher	0.8	1.3
Nitrogen	0.05	0.3
CO_2	0.560	0.560
Density Relative to Air	7,930	7,860
Heat of Burning, Lowest, in gcal/m^3	8,800	8,740

In addition to the gas pools in the Cenomanian horizon, productive horizons have been found at the Medvezh'ye deposit in the Lower Cretaceous Valanginian and Middle Jurassic beds.

The gases of these horizons differ in composition from the Cenomanian gases; they are classified as gas condensate for the Valanginian layers and petroleum-gas in the Jurassic beds.

The Zapolyarnoye Deposit

The Zapolyarnoye gas deposit is located 100 kilometers southeast of the settlement of Tazovo. The deposit was discovered in 1965.

The gas-bearing horizons occur in the Turonian and Cenomanian stages of the Upper Cretaceous.

The primary gas reserves are found in the Cenomanian beds. The Cenomanian productive horizon lies in a vaulted part at a depth of 1,130 meters and is composed of interstratified layers and lenses of sandstone, aleurolites, and clays. The gas traps are sand-aleurolite rocks. The Cenomanian beds are overlain by dense Lower Turonian clays about 40 meters thick. The pool is a massive, floating type 47 kilometers long and 29 wide with a slight tilt, from 1,308 to 1,315 meters, of the gas-water contact. The tilt is to the northeast. The gas layer is 225 meters thick; initial layer pressure was 133 kilogram-force per square centimeter and the temperature is 34 degrees C.

The Turonian productive horizon lies 70-100 meters above the Cenomanian and is composed of alternating aleurolite clays, argillaceous sandstones, and aleurolites. It is a layered, arching pool 38 kilometers long and 20 wide with initial layer pressure of 125.8 kilogram-force per square centimeter.

The composition of gases from the Zapolyarnoye deposit is shown in Table 24, next page.

The Tazovskoye deposit

The Tazovskoye deposit is located northeast of the Zapolyarnoye deposit, 12 kilometers southeast of the settlement of Tazovskoye. The deposit was discovered in 1962.

The Tazovskoye structure is an asymmetric dome-like fold, slightly elongated in a northwesterly direction, 28 kilometers long and 16 wide on the roof of the productive horizon.

The productive beds are Cenomanian, composed of sandy-aleurolite rocks and overlain by thick (850 meters) Upper Cretaceous beds of clay.

The massive, floating-type gas pool is located in the upper part of the Cenomanian beds at a depth of 1,120-1,165 meters. The layer pressure is 112.9 kilogram-force per square centimeter. The gas horizon is 55 meters thick.

In addition to 53,000 cubic meters of gas yield a day from wells, 15-16 cubic meters of petroleum a day has been extracted from the lower part of the Cenomanian pool.

The gases of the Cenomanian pool of the Tazovskoye deposit have the same composition as gases identified in Cenomanian beds at other sites of the northern group of deposits in the Western Siberian Lowland.

The Valanginian horizon of the Lower Cretaceous and the Jurassic beds of the Tazovskoye deposit also contain gas.

The composition of gas from the Valanginian horizon differs from the gas of the Cenomanian pool in its higher content of homologues of methane and slightly higher levels of CO_2 and nitrogen.

Tests of gas from the Jurassic beds, which lie lowest, indicate that the hydrocarbon composition of the gas is still heavier.

Data on the composition of gases from the productive layers of the Tazovskoye deposit are given in Tables 25 and 26 below.

Table 24. Description of Gas from the Zapolyarnoye Deposit (Cenomanian Beds)

Номер скважины (a)	Глубина, м (b)	(c) Содержание компонентов, %							Плотность по воздуху (d)	Теплота сгорания, ккал/м³ (e)	
		CO_2	CH_4	C_2H_6	C_3H_8	C_4H_{10}	C_5H_{12}+ higher	N_2		низшая (f)	высшая (g)
24	1255—1275	0,13	98,8	0,07	0,01	0,004	0,01	1,0	0,561	7910	8790
20	1259—1281	0,20	98,4	0,07	0,005	0,003	0,01	1,3	0,555	7900	8740
18	1247—1265	0,04	98,8	0,08	0,002	0,001	0,01	1,0	0,560	7910	8780
31	1068—1095	0,28	95,4	0,11	0,006	0,001	0,001	3,9	0,563	7600	8390
16	1301—1320	0,30	98,5	0,15	0,02	0,010	0,01	1,0	0,564	7900	8760
30	1054—1154	0,30	99,0	0,05	0,003	0,001	0,001	0,6	0,562	7920	8800
3	1054—1087	0,36	99,1	0,05	0,002	0,001	—	0,5	—	—	—

Table 25. Description of Gases from the Gas Condensate Pool of the Tazovskoye Deposit

Интервал перфорации, м (h)	(c) Содержание компонентов, %										Плотность по воздуху (d)	Теплота сгорания низшая, ккал/м³ (e)
	CO_2	CH_4	C_2H_6	C_3H_8	$i\text{-}C_4H_{10}$	$n\text{-}C_4H_{10}$	$i\text{-}C_5H_{12}$	$n\text{-}C_5H_{12}$	C_6+ higher	N_2		
Валанжинские отложения (Valanginian Beds)												
2720—2740	0.48	96.5	1.7	0.27	0.05	0.01	0.01		0.08	1.0	0.575	8050
2904—2919	0.4	93.1	2.1	0.28	0.03	0.03	0.05		0.01	3.2	0.583	7850
3047—3062	0.5	91.2	2.1	0.30	0.06	0.01	0.06	0.05	0.1	4.9	0.596	8580
Юрские отложения (Jurassic Beds)												
3770—3780	0.6	87.5	6.7	2.10	0.28	0.31	0.06	0.04	0.1	2.4	0.636	8590

Key: (a) Well Number;
(b) Depth, meters;
(c) Components, percentage;
(d) Density Relative to Air;
(e) Heat of Burning, gcal/m^3;
(f) Lowest;
(g) Highest;
(h) Perforation Interval, meters.

Table 26. Description of the Gas of the Cenomanian Gas Pool of the Tazovskoye Deposit

Интервал перфорации, м (a)	(b) Содержание компонентов, % CO_2	CH_4	C_2H_6	C_3H_8	C_4H_{10}	C_5+ higher	N_2	Плотность по воздуху (c)	Теплота сгорания низшая, ккал/м³ (d)
1128—1148	0,12	98,7	0,15	0,03	0,01	0,01	1,0	0,563	7020
1141—1147	0,3	99,1	0,10	0,008	0,002	0,01	0,5	0,562	7040
1148—1154	0,16	98,2	0,10	0,01	0,002	0,01	1,5	0,564	7830
1156—1161	0,20	99,1	0,15	0,03	0,01	0,01	0,5	0,560	8810
1161—1170	0,20	98,8	0,10	0,01	0,005	0,01	0,9	0,561	7910
1160—1185	0,20	98,6	0,10	0,03	0,01	0,01	1,0	0,562	7000

Key: (a) Perforation Interval, meters;
(b) Components, percentage;
(c) Density Relative to Air
(d) Heat of Burning, Lowest, gcal/m^3.

The Russkoye Deposit

This deposit is located southeast of the Zapolyarnoye deposit. The productive gas pool has been identified in Cenomanian beds at a depth of 800-914 meters.

The composition of gas from the Cenomanian pool is similar to gases from the productive layers of the Cenomanian of the northern group of deposits of the Western Siberian Lowland; it is classified as methane gas with a very low content of methane homologues (about 0.1 percent, see Table 27 below).

Table 27. Description of Gas from the Cenomanian Gas Pool of the Russkoye Deposit

Глубина перфорации, м (a)	(b) Содержание компонентов, % CO_2	CH_4	C_2H_6	C_3H_8	C_4H_{10}	C_5+ higher	N_2	Плотность по воздуху (c)	Теплота сгорания низшая, ккал/м³ (d)
800—807	0,18	96,9	0,09	0,003	0,001	0,001	2,8	0,567	7760
930—945	1,30	94,5	0,02	0,006	—	—	4,1	0,585	7550
889—897	0,16	96,4	0,05	—	—	—	3,2	0,567	7700
910—914	0,75	96,4	0,04	—	—	—	2,7	0,573	7700
	0,50	96,7	0,02	0,006	0,002	<0,01	2,6	0,571	7730
1891—1906	0,36	98,8	0,16	0,01	0,004	—	0,7	0,563	7920
2110—2115	0,20	98,8	0,19	0,01	0,005	—	0,8	0,561	7920

[Key designation are same as Table 26 above.]

The Gubkinskoye Deposit

The Gubkinskoye or Purpeyskoye gas deposit is located in the southern part of the Northern Group of Deposits of the Western Siberian Lowland.

It occurs in the Purpeyskoye local uplift, 80 kilometers southwest of the settlement of Torki-Sal. The deposit was discovered in 1965.

The Purpeyskoye uplift is an elongated platform-type fold. The uplift has two dome-like folds. It is 64 kilometers long and 14 wide.

The gas pool is confined to Cenomanian beds of the Upper Cretaceous. A clay stratum of Upper Cretaceous sediments up to 450 meters thick acts as the cap. The productive horizon lies at 670-790 meters and is composed of interstratified layers of sandstone, aleurolites, and clays. The gas traps are sandy-aleurolite rocks. The pool is a massive, floating type with an initial layer pressure of 76-78 kilogram-force per square centimeter. The gas temperature in the pool is 21 degrees C.

Gases from the Cenomanian pool of the Gubkinskoye deposit have a somewhat higher level of methane homologues than gases from the other deposits of the Northern Group considered above, which strike in a northeasterly direction (see Table 28 below).

Table 28. Description of Gas from the Cenomanian Gas Pool of the Gubkinskoye Deposit

Глубина, м (a)	(b) Содержание компонентов, %							Плотность по воздуху (c)	Теплота сгорания низшая, ккал/м³ (d)
	CO_2	CH_4	C_2H_6	C_3H_8	C_4H_{10}	C_5H_{12}+ higher	N_2		
709—719	0,2	97,7	0,27	0,002	—	—	1,7	0,564	7850
820—807	0,47	97,9	<0,01	0,01	—	—	1,6	0,565	7830
793—822	0,45	97,7	<0,01	<0,01	—	—	1,8	0,566	7810
708—720	0,1	98,5	0,2	<0,01	—	—	1,2	0,562	7900
740—750	0,2	98,7	0,10	0,005	0,001	0,001	1,0	0,560	7880
713—721	0,1	98,6	0,10	0,01	0,016	0,0005	1,2	0,560	7890

[Key designations are same as Table 26 above.]

For industrial assessment, the following average composition of the Cenomanian pool of the Gubkinskoye deposit may be adopted (percentages):

CH_4 -- 98.4
C_2H_6 -- 0.13
C_3H_8 -- 0.01
C_4H_{10} -- 0.005
C_5H_{12}+higher -- 0.01
N_2 -- 1.3
CO_2 -- 0.15

The gas density relative to air is 0.564; the lowest heat of burning is 7,890 gigacalories per cubic meter and the highest is 8,760.

The Komsomol'skoye Deposit

This deposit is located 40 kilometers west of the Gubkinskoye deposit. It was discovered in 1966.

long

Three dome-like uplifts are singled out within the fold. The productive horizons at the deposit are sandy-aleurolite Cenomanian beds. Turonian-Paleogenic clay rocks form the cap of the pool.

The gas pool is an arching, massive type. Its layer pressure is 100 kilogram-force per square centimeter and the temperature is 25 degrees C.

Exploratory drilling in the northern part of the uplift (the North Komsomol'skoye area) indicated the presence of a petroleum fringe. Gas condensate pools have been identified in Upper Jurassic beds.

The composition of gas from the Komsomol'skoye deposite is described by the data given in Table 29 below.

Table 29. Description of Gases from the Komsomol'skoye Deposit

Интервал перфорации, м (a)	(b) Содержание компонентов, %								Плотность по воздуху (c)	Теплота сгорания низшая, ккал/м³ (d)
	CO_2	CH_4	C_2H_6	C_3H_8	C_4H_{10}	C_5H_{12}	C_6 + higher	N_2		
Газовая залежь сеноманских отложений (e)										
992—1000	0,2	98,5	0,17	0,01	0,002	0,001	<0,01	1,1	0,563	7900
992—1000	0,1	97,2	0,12	0,008	0,001	0,001	<0,01	2,5	0,582	7790
992—1000	0,2	97,2	0,10	0,005	0,001	0,001	0,01	2,4	0,568	7780
870—880	0,4	95,8	0,13	0,005	<0,001	0,001	<0,01	3,6	0,525	7020
1093—1098	0,1	97,7	0,45	0,01	0,003	0,002	0,01	1,8	0,568	7850
Газоконденсатная залежь юрских отложений (f)										
1885—1910	0,2	94,5	2,1	0,5	0,1	0,05	0,05	1,6	0,586	8140

Key: (a) Perforation Interval, meters;
(b) Components, percentage;
(c) Density Relative to Air;
(d) Heat of Burning, Lowest, gcal/m^3;
(e) Gas Pool of the Cenomanian Beds;
(f) Gas Condensate Pool of the Jurassic Beds.

The Pyakopurovskoye Deposit

This deposit is located southwest of the Gubkinskoye deposit. The gas pool at this deposit has been identified in Cenomanian beds and has the following average composition (in percentage):

CH_4	-- 97.0	C_4H_{10}	-- 0.001	N_2	-- 2.5
C_2H_6	-- 0.16	C_5H_{12}+higher	-- 0.01	CO_2	-- 0.3
C_3H_8	-- 0.005				

... heat of ... is 7,770 giga ...es per cubic meter.

The Vyngapurovskoye Deposit

This deposit is located southwest of the Gubkinskoye deposit within an elongated brachyanticlinal fold.

Industrially feasible gas presence has been established in Cenomanian beds lying at a depth of 987-1,091 meters overlain by a stratum of Turonian clay rocks.

The productive beds are composed of sandy-aleurolite and clay rocks. The pool is a massive type.

The composition of the gas from the Cenomanian pool of this deposit has a higher content of hydrocarbons heavier than methane, up to 0.5 percent.

A differentiation of gas composition according to depth of productive layers has been established; it indicates that gas exchange processes occur both within the Cenomanian pool and in its relationship to the lower productive Jurassic beds, which have been opened up at depths of 3,430-3,470 meters.

A description of the gases is given in Table 30 below.

Table 30. Description of Gas from the Cenomanian Pool of the Vyngapurskoye Deposit

Глубина, м (a)	(b) Содержание компонентов, %					Плотность по воздуху (c)	Теплота сгорания низшая, ккал/м³ (d)
	CO_2	CH_4	C_2H_6	C_3H_8	N_2		
980—994	0,42	95,1	0,16	0,006	4,0	0,572	8160
1035—1045	0,48	98,1	0,14	0,002	1,2	0,566	8420
1047—1052	0,19	95,1	0,32	<0,001	4,3	0,578	8190
1090—1124	0,11	95,2	0,48	0,001	4,1	0,579	8220

[Key designation are same as for Table 26 above.]

The Novoportovskoye Deposit

The Novoportovskoye gas condensate deposit is located in the northwestern part of the Northern Group of Deposits, on the Yamal Peninsula 290 kilometers northeast of the city of Salekharda. The deposit was discovered in 1964.

The Novoportovskoye uplift is a northwesterly striking brachyanticlinal fold. Its roof, composed of Valanginian beds, is 55 kilometers long and 20 wide.

The productive horizons at this deposit were found in Lower Cretaceous and Jurassic beds.

Flows of gas have been received from Albian beds in the Lower Cretaceous sediments. The yield of the wells is about 100,000 cubic meters a day.

Insignificant petroleum flows have been received lower in the cross-section, from the roof of the Aptian beds.

The primary gas condensate pool at the deposit is confined to Valanginian beds (Lower Cretaceous); it is as much as 150 meters thick in the southern part of the uplift and 15-20 meters on the limbs in the northern part. Three productive horizons are singled out within the Valangian stratum.

The upper productive horizon has an alternation of sandstones, aleurolites, and clays. The horizon is up to 25 meters thick. It is an arched, layered pool. The gas contains condensate.

The second Valanginian horizon is composed of sandstones. The cap is a clay packet 10-70 meters thick. This is an arched, layered gas condensate pool with a small petroleum fringe. The water-gas contact is at 1,920 meters.

The third productive horizon lies at the base of the Valanginian beds. This horizon is composed of a packet of alternating sandstones, aleurolites, and argillites. A clay layer 10-25 meters thick serves as the cap.

The gas condensate pool has a small petroleum fringe. The layer pressure of the gas is 185-190 kilogram-force per square centimeter.

In the Middle Jurassic beds the gas condensate pool is confined to the lower part of the cross-section, which is composed of fine-grained sandstones and aleurolite interlayers.

An insignificant amount of petroleum is extracted with the gas from some wells.

The gases of the primary Valanginian pool of the Novoportovskoye deposit and the gas pool identified in Jurassic beds contain, in addition to methane, significant amounts of ethane (up to 6.5 percent) and propane (about two percent) as well as more high molecular hydrocarbons, which are a valuable component for obtaining market products. The composition of the gases is virtually the same in the different pools and can be described by the averaged values given for all pools in Table 31 (next page).

Table 31. Description of Gas from the Novoportovskoye Gas Condensate Deposit

Номер скважины (a)	Интервал перфорации, м (b)	(c) Содержание компонентов, %										(d) Плотность по воздуху	(e) Теплота сгорания, ккал/м³
		CO_2	CH_4	C_2H_6	C_3H_8	$i\text{-}C_4H_{10}$	$n\text{-}C_4H_{10}$	$i\text{-}C_5H_{12}$	$n\text{-}C_5H_{12}$	C_6+higher	N_2		
Нижнемеловые отложения (Lower Cretaceous Beds)													
5	1796—1801	0,7	89,2	5,6	2,1	0,44	0,48	0,21	0,18	0,2	1,0	0,643	8330
	1819—1827	1,0	90,0	5,0	2,0	0,42	0,45	0,16	0,08	0,2	1,2	0,641	8720
53	—	0,4	89,8	6,3	2,0	0,59	0,68	0,18	0,05	0,1	0,3	0,642	8960
79	1796—1802	0,5	88,9	6,6	2,5	0,52	0,54	0,15	0,10	0,2	0,3	0,645	9030
79	1925—1835	0,8	91,0	4,5	1,6	0,40	0,44	0,16	0,11	0,3	1,0	0,631	8520
1	1903—1908	1,0	83,9	6,0	1,8	0,45	0,30	0,14	0,04	0,1	6,3	0,643	8210
78	1982—2000	0,4	88,1	6,6	2,2	0,46	0,48	0,18	0,14	0,2	1,5	0,636	8900
78	1891—1996	0,8	89,1	5,4	1,5	0,47	0,12	0,16	0,01	0,1	2,5	0,631	8460
Юрские отложения (Jurassic Beds)													
80	1909—1915	1,0	81,0	9,2	3,7	0,85	1,2	0,4	0,34	0,2	1,6	0,705	9480
80	2012—2017	0,3	89,5	5,4	1,5	0,42	0,02	0,06	0,01	0,1	3,1	0,637	8490
78	2040—2054	0,3	89,5	5,1	2,0	0,36	0,45	0,1	0,08	0,1	2,2	0,629	8630
78	2134—2140	0,4	88,6	5,5	1,4	0,43	0,10	0,14	0,03	0,1	3,3	0,628	8400

Key: (a) Well Number;
(b) Perforation Interval, meters;
(c) Components, percentage;
(d) Density Relative to Air;
(e) Heat of Burning, Lowest, gcal/m^3.

APPROVED FOR RELEASE: 2007/02/08: CIA-RDP82-00850R000100010012-6

The Messoyakhskoye Deposit

The Messoyakhskoye deposit is located in Krasnoyarskiy Kray, 130 kilometers west of the city of Noril'sk. It was discovered in 1967 and brought into operation in 1969.

The deposit is confined to a large brachyanticlinal fold that is 35 kilometers long and 20 wide at the roof of its productive Cenomanian stratum.

Gas presence is associated with terrigenous beds of the Cenomanian Stage, which is composed of sandstones and aleurolites interbedded with clays. The pool is capped by a 100-meter stratum of clay of the Turonian Stage. The productive stratum is 50-60 meters thick.

The productive layers lie at depths of 750-890 meters. The initial layer pressure is 76.0-77.6 kilogram-force per square centimeter (hydrostatic), and the temperature is 11-12 degrees C. In addition to the Cenomanian, exploratory drilling has revealed the presence of gas in the Jurassic beds of the Messoyakhskoye deposit.

The hydrocarbon composition of the Cenomanian gas is like the composition of the Cenomanian gas at other areas of the Northern Group of Deposits of the Western Siberian Lowland. It is a methane gas with a low level of heavy hydrocarbons (see Table 32, next page).

The gas pools in the Jurassic beds have not been adequately explored and little study of their composition has been done. However, analyses made of gases obtained from well testing at depths of 1,936-2,096 meters show that they differ from the gases of the Cenomanian pool by hydrocarbon composition; they are methane gases. In this respect the gases of the Jurassic beds of the Messoyakhskoye deposit differ fundamentally from the gases of the Jurassic beds at other sites of the Northern Group of Deposits of the Western Siberian Lowland.

The average composition (in percentages) of gases from the Cenomanian Stage and Jurassic beds of the Messoyakhskoye deposit is as follows:

Component	CH_4	C_2H_6	C_3H_8	C_4H_{10}	C_5H_{12}+higher	N_2	CO_2
Cenomanian pool	97.6	0.10	0.03	0.005	0.01	1.6	0.6
Jurassic beds	96.5	0.15	0.006	0.002	0.01	3.0	0.5

The Zimneye Deposit

This deposit is located 180 kilometers west of the city of Noril'sk, on the lower reach of the Yenisey River. It was discovered in 1960 and is confined to a brachyanticlinal uplift elongated in a northeasterly direction. It is 17 kilometers long and six wide at its Middle Jurassic roof.

Table 32. Description of Gases from the Messoyakhskoye Deposit

Номер скважины (a)	Интервал перфорации, м (b)	(c) Содержание компонентов, %							(d) Плотность по воздуху	(e) Теплота сгорания, ккал/м³
		CO_2	CH_4	C_2H_6	C_3H_8	C_4H_{10}	C_5+ higher	N_2		
5	810—820	0,5	98,7	0,01	0,003	0,001	0,001	0,8	0,556	7890
7	828—875	0,7	98,4	0,05	0,01	0,003	0,001	0,8	0,554	7870
9	833—839	0,4	98,5	0,05	0,008	0,002	0,002	1,0	0,557	7880
6	885—877	0,4	98,7	0,07	0,01	0,003	0,001	0,8	0,557	7900
8	858—879	0,5	98,3	0,10	0,02	0,004	0,006	0,9	0,556	7870
8	858—879	0,5	97,5	0,11	0,02	0,01	0,002	1,9	0,562	7800
9	817—827	0,4	97,5	0,06	0,03	0,002	0,002	1,9	0,569	7790
7	828—840	0,4	98,0	0,05	0,005	0,002	0,01	1,6	0,566	7830
137	847—853	0,7	97,5	0,04	0,01	0,002	0,01	1,5	0,568	7780
6	868—872	0,7	97,4	0,03	0,01	0,002	0,01	1,9	0,571	7770
117	843—853	0,7	97,7	0,03	0,005	0,002	0,002	1,5	0,568	7720
137	847—853	0,7	97,7	0,04	0,01	0,002	0,002	1,5	0,568	7780

Key: (a) Well Number;
(b) Perforation Interval, meters;
(c) Components, percentage;
(d) Density Relative to Air;
(e) Heat of Burning, gcal/m^3.

Table 33. Description of the Productive Horizons of the Zimneye Deposit

Indexes	Horizons		
	I	II	III
Beds	Bazal'skiye	Malyshevskaya Series Middle Jurassic	Zimnyaya Zeries Middle Jurassic
Rock	Pockets of and and sandstones	Sandstones with interlayers of dense carbonate sandstones and clays	Sandstones with interlayers of aleurolites and argillites
Depth, meters	1,750	1,825	2,925-2,944
Layer Pressure, gcal/cm^2	166	180	293
Temperature, degrees C.	35	37	71

Table 34. Description of the Gases of the Zimneye Deposit

(a) Показатели	(b) Валанжинские отложения		(c) Юрские отложения		
	1750–1780 м	1825–1847 м	2375–2395 м	2870–2908 м	2925–2944 м
(d) Содержание компонентов, %					
Метан (e)	97,5	97,2	97,2	89,9	82,8
Этан (f)	1,2	1,0	0,7	4,09	10,7
Пропан (g)	0,03	0,02	0,02	1,8	3,9
Бутаны (h)	0,02	0,01	0,01	0,75	0,80
Пентаны + высшие (i)	0,01	0,01	0,01	0,20	0,30
Азот (j)	1,0	1,5	1,0	1,0	1,5
Углекислый газ (k)	0,2	0,3	0,8	0,6	0,7
(l) Плотность по воздуху	0,570	0,569	0,569	0,627	0,683
(m) Теплота сгорания низшая, ккал/м^3	7980	7920	7880	8540	9290

Key: (a) Indexes;
(b) Valanginian Beds;
(c) Jurassic Beds;
(d) Components, percentage;
(e) Methane;
(f) Ethane;
(g) Propane;
(h) Butanes;
(i) Pentanes and Higher;
(j) Nitrogen;
(k) Carbon Dioxide;
(l) Density Relative to Air;
(m) Heat of Burning, Lowest, gigacalories per cubic meter.

The main productive stratum is confined to terrigenous beds of the Valanginian Stage of the Lower Cretaceous. Gas is present in Jurassic beds.

The productive Valanginian Stage is composed of sandstones alternating with clays.

Three productive layers, numbered I-III, have been identified in the cross-section of the deposit (see Table 33 above).

The gases of the productive horizons of the deposit differ by chemical composition both in the pool of the Valanginian Stage and in the pools confined to Jurassic beds.

Table 34 above gives a description of the composition of gases from the productive layers of the Zimneye deposit.

The Soleninskoye Deposit

The Soleninskoye gas condensate deposit is located 35 kilometers west of the Messoyakhskoye deposit.

The deposit is confined to the uplift of the same name. The uplift has two domes, a northern one and a southern one.

The sand layers of the Sukhodudinskaya Series of the Lower Cretaceous hold industrially feasible gas.

Four productive layers have been identified in the cross-section at depths of 2,300-2,450 meters. The deposit has a high initial layer pressure.

The first layer lies at 2,298-2,312 meters. It is about 25 meters thick, with a layer pressure of 228 kilogram-force per square centimeter and a temperature of 48 degrees C.

The second layer is composed of sandstones with clay interlayers. A clay layer 18-28 meters thick separates it from the first productive layer. The layer pressure in this pool is 231 kilogram-force per square centimeter and the temperature is 48 degrees C.

The third and fourth layers form a single hydrodynamically connected system. The layers were tested together as one pool. The initial layer pressure in the pool is 242 kilogram-force per square centimeter and the temperature is 49 degrees C. It is an arched, layered, gas condensate pool.

The gases of the deposit have a high level of homologues of methane.

Table 35 (next page) presents figures on the composition of gases from the deposit.

The Palyatkinskoye Deposit

This deposit is located 30 kilometers from the Messoyakhskoye deposit and is confined to a structure of the same name, a gently inclined northeast-trending brachyanticlinal fold.

Table 35. Description of Gas from the Soleninskoye Deposit

Показатели (a)	Скв. 8	Скв. 17	Скв. 3	Скв. 3	Скв. 6	Скв. 1
	2200–2305 м	2306–2404 м	2357–2371 м	2300–2314 м	2448–2456 м	2767–2773 м
(b) Содержание компонентов, %						
Метан (c)	95,5	95,4	95,8	95,0	93,9	95,7
Этан (d)	3,3	3,0	2,0	3,5	3,0	7,7
Пропан (e)	0,07	0,08	0,07	0,08	0,5	3,7
Бутан (f)	0,25	0,25	0,20	0,30	0,55	1,2
Пентан (g)	0,05	0,07	0,05	0,08	0,35	0,3
Гексан + высшие (h)	0,1	0,2	0,1	0,2	0,2	0,2
Азот (i)	0,2	0,6	0,5	0,3	1,0	1,0
Углекислый газ (j)	0,5	0,4	0,4	0,5	0,5	0,2
(k) Плотность по воздуху	0,580	0,588	0,582	0,591	0,606	0,666
(l) Теплота сгорания низшая, ккал/м³	8240	8240	8200	8300	8300	0240

Key: [Headings above six columns of numbers indicate the number of a particular well and its depth.]

(a) Indexes;
(b) Components, percentage;
(c) Methane;
(d) Ethane;
(e) Propane;
(f) Butane;
(g) Pentane;
(h) Hexane and Higher;
(i) Nitrogen;
(j) CO_2;
(k) Density Relative to Air;
(l) Lowest Heat of Burning, gigacalories per cubic meter.

The industrially feasible gas presence at the deposit is associated with the highly permeable sand-aleurolite layers of the lower part of the Sukhdudinskaya Series of the Lower Cretaceous.

Five productive layers have been identified at the deposit.

Layer SD_3 [for Sukhodudinskaya] is notable for the homogeneity of its lithological composition. The layer is 18-20 meters thick and has an initial layer pressure of 225 kilogram-force per square centimeter.

Layer SD_4 is separated from SD_3 by a packet of clay rocks 10-20 meters thick. This layer is composed of sandstones with interstratified clay interlayers. The layer is 10-26 meters thick and has an intial layer pressure of 231 kilogram-force per square centimeter.

Layer SD_5 was tested together with SD_4. The layer has not been shown to be independently important. Its thickness is 5-35 meters.

Layer SD_6 has the largest gas condensate pool in the cross-section of the Pelyatkinskoye deposit. It is 62.6-72.6 meters thick. The layer is composed of alternating sand and clay sheets. The initial layer pressure in the pool is 233.8 kilogram-force per square centimeter.

The lowest pool is associated with the traps of layer SD_8, which is separated from layer SD_6 by a clay packet 30-45 meters thick. The total thickness of the layer is 28-36 meters, and it has a layer pressure of 250.7 kilogram-force per square centimeter.

The composition of the gases of the gas condensate pools of the deposit is given in Table 36 below.

Table 36. Composition of Gas from the Pelyatkinskoye Gas Condensate Deposit (in percentage, by individual wells)

Компоненты (a)	(b) Глубина залегания, м						
	2357–2375	2382–2388	2400–2500	2416–2442	2517–2525	2617–2625	2704–2710
Метан (c)	92,1	91,8	91,0	93,8	95,5	95,0	93,9
Этан (d)	3,6	3,4	3,7	2,6	2,8	3,0	2,6
Пропан (e)	0,13	0,10	0,13	0,10	0,12	0,9	0,15
изо-Бутан (f)	0,17	0,13	0,47	0,06	0,29	0,11	0,23
н-Бутан (g)	0,02	0,01	0,13	0,01	0,02	0,14	0,04
изо-Пентан (h)	0,02	0,02	0,02	0,02	0,15	0,02	0,07
н-Пентан (i)	0,02	0,02	0,02	0,03	0,02	0,01	0,01
Гексан + высшие (j)	0,1	0,2	0,2	0,2	0,1	0,1	0,2
Азот (k)	2,9	3,7	3,7	2,1	0,5	0,4	1,9
Углекислый газ (l)	0,3	0,3	0,4	1,0	0,5	0,4	0,6

Key: (a) Components; (b) Depth, meters; (c) Methane; (d) Ethane; (e) Propane; (f) iso-Butane; (g) n-Butane; (h) iso-Pentane; (i) n-Pentane; (j) Hexane + Higher; (k) Nitrogen; (l) CO_2.

The Kazantsevskoye Deposit

This deposit is located 110 kilometers northwest of the city of Dudinki, in the central part of the Yenisey-Khatanga trough.

Industrially feasible gas is confined to the Odykinskaya Series of the Lower Cretaceous. Lithologically the horizon is composed of sandstones with interlayers of dense carbonate sandstones. The productive series are capped by clays 10-15 meters thick. Several productive layers are singled out in the cross-section: SD_2, SD_6, SD_8, SD_9, and SD_{10}. The initial layer pressure in the 2,407-2,415 depth interval is 233 kilogram-force per square centimeter and the temperature is 49 degrees C.

The gases of the deposit are similar to gases from the Pelyatkinskoye and Solenenskoye deposits.

Table 37 (next page) shows the composition of this gas.

Table 37. Description of Gas from the Kazantsevskoye Deposit

Показатели (a)	Скв. 1 2265—2290 м	Скв. 1 2365—2375 м	Скв. 1 2345—2350 м	Скв. 1 2167—2215 м	Скв. 5 2191—2240 м	Скв. 5 2613—2625 м	Скв. 1 2651—2680 м	Скв. 6 2651—2680 м
Содержание компонентов, % (b)								
Метан (c)	95,4	90,1	95,3	95,3	94,2	92,4	90,0	80,7
Этан (d)	3,3	2,5	2,7	3,1	2,5	3,2	7,1	8,0
Пропан (e)	0,02	0,02	0,02	0,03	0,05	0,4	0,2	0,2
изо-Бутан (f)	0,03	0,02	0,01	0,01	0,11	0,27	0,05	0,03
н-Бутан (g)	0,01	0,01	0,02	0,06	0,02	0,03	0,04	0,02
изо-Пентан (h)	0,02	0,01	0,02	0,02	0,05	0,00	0,02	0,02
н-Пентан (i)	0,04	0,03	0,01	0,01	0,01	0,01	0,01	0,01
Гексан + высшие (j)	0,17	0,00	0,05	0,07	0,1	0,1	0,00	0,05
Азот (k)	0,8	1,0	1,7	1,0	2,0	3,0	1,0	1,0
Углекислый газ (l)	0,2	0,2	0,2	0,4	0,4	0,5	0,0	0,4
(m) Плотность по воздуху	0,581	0,575	0,578	0,584	0,594	0,602	0,605	0,600
(n) Теплота сгорания низшая, ккал/м³	8200	8000	8040	8160	8120	8070	8380	8400

Key: [Headings above eight columns of numbers indicate well numbers and depths]

(a) Indexes;
(b) Components, percentage;
(c) Methane;
(d) Ethane;
(e) Propane;
(f) iso-Butane;
(g) n-Butane;
(h) iso-Pentane;
(i) n-Pentane;
(j) Hexane + Higher;
(k) Nitrogen;
(l) CO_2;
(m) Density Relative to Air;
(n) Lowest Heat of Burning, $gcal/m^3$.

The Dzhangotskoye Deposit

This deposit is located 185 kilometers north of the city of Noril'sk, in a structure of the same name that occurs in the arched part of the large Rassokhinskiy Ridge. The uplift strikes northeast.

Industrially feasible gas presence is linked to beds of the Odykhanskaya Series of the Lower Cretaceous. Lithologically, the productive horizon is composed of clays, aleurolites, and sandstones with thin aleurolite interlayers.

Layer pressure of the pool in the tested depth interval of 969-977 meters is 77.2 kilogram-force per square centimeter and the temperature is 11 degrees C.

The composition of the gases from the tested depth intervals is shown in Table 38 (next page).

Table 38. Description of Gas from the Dzhangotskoye Deposit

(a) Показатели	(b) Глубина залегания, м		
	969–977	1010–1040	1131–1150
(c) Содержание компонентов, %			
Метан (d)	97,3	98,2	95,8
Этан (e)	0,11	0,11	2,2
Пропан (f)	0,01	0,01	0,35
Бутан (g)	0,01	0,01	0,25
Пентан + высшие (h)	0,01	0,01	0,05
Азот (i)	1,1	1,0	1,5
Углекислый газ (j)	0,5	0,0	0,5
(k) Плотность по воздуху	0,568	0,565	0,583
(l) Теплота сгорания низшая, ккал/м³	7790	7800	8130

Key: (a) Indexes; (b) Depth, meters; (c) Components, %; (d) Methane; (e) Ethane; (f) Propane; (g) Butane; (h) Pentane + Higher; (i) Nitrogen; (j) Carbon Dioxide; (k) Density Relative to Air; (l) Lowest Heat of Burning, gcal/m^3.

The Nizhnekhetskoye Deposit

This deposit is located 75 kilometers west of the city of Noril'sk and was discovered in 1966.

It is a brachyanticline. The deposit is 10 kilometers long and five wide. Upper Jurassic aleurolite beds contain the gas. The gas-bearing horizon is capped by a clay packet 24-29 meters thick. It is a massive pool with a layer pressure of 85 kilogram-force per square centimeter, temperature of 20 degrees C., and tested depth interval of 892-905 meters. It contains methane gases of the following composition:

CH_4 -- 98.1
C_2H_4 -- 0.02
C_3H_8 -- 0.01
C_4H_{10} and higher -- 0.005
N_2 -- 0.6
CO_2 -- 0.2.

The gas has a density of 0.555 relative to air; its lowest heat of burning is 7,910 gigacalories per cubic meter.

The Yamburgskoye Deposit

This deposit is located 120 kilometers northeast of the Tazovskoye deposit. It is a platform-type structure oriented in a submeridional (northeasterly) direction. The structure is 160 kilometers long and 45 wide.

Industrial reserves of gas have been found in the Cenomanian Cretaceous beds and in Valanginian sediments. In the Cenomanian beds the productive horizons lie at depths of 1,035-1,210 meters. The pool has a layer pressure of 117 kilogram-force per square centimeter and a temperature of 30 degrees C. It is a layered, massive pool. Table 39 (next page) gives a description of the gases.

Table 39. Description of Gas from the Yamburgskoye Deposit (By Individual Wells)

Показатели (a)	(b) Глубина залегания, м					
	1145—1154	1155—1168	1120—1127	1176—1185	1178—1181	1201—1209
(c) Содержание компонентов, %						
Метан (d)	95,2	95,3	95,3	95,5	95,1	96,8
Этан (e)	0,04	0,04	0,04	0,03	0,03	0,04
Пропан (f)	0,006	0,005	0,004	0,004	0,005	0,006
Бутан (g)	0,001	0,001	0,001	0,001	0,002	0,002
Пентан + высшие (h)	0,01	0,01	0,01	0,01	0,01	0,01
Азот (i)	4,5	4,2	4,2	3,7	4,0	2,7
Углекислый газ (j)	0,3	0,4	0,4	0,7	0,8	0,4
(k) Плотность по воздуху	0,578	0,577	0,577	0,578	0,580	0,569
Теплота сгорания низшая, (l) ккал/м³	7020	7020	7020	7040	7010	7740

Key: (a) Indexes; (g) Butane;
(b) Depth, meters; (h) Pentane and Higher;
(c) Components, %; (i) Nitrogen;
(d) Methane; (j) Carbon Dioxide;
(e) Ethane; (k) Density Relative to Air;
(f) Propane; (l) Lowest Heat of Burning, gcal/m^3.

The Arkticheskoye Deposit

This deposit is located northwest of the Novoportovskoye deposit. The gas pool was found in Cenomanian beds at depths of 675-760 meters and the gas condensate pool in Valanginian and Jurassic beds at depths of 1,688-2,455 meters.

Table 40 below describes gases from the productive layers of the deposit.

Table 40. Description of Gases from the Arkticheskoye Deposit

Indexes	Cenomanian	Valanginian	Indexes	Cenomanian	Valanginian
Components,%					
Methane	97.1	87.5	Hexane+Higher	- -	0.1
Ethane	0.1	6.8	Nitrogen	2.5	2.9
Propane	0.01	1.1	CO_2	0.2	0.3
iso-Butane	0.004	0.66			
n-Butane	-	0.27	Density Relative to Air	0.568	0.638
iso-Pentane	0.001	0.23			
n-Pentane	-	0.10	Lowest Heat of Burning, gcal/m^3	7,780	8,600

The Yamsoveyskoye Deposit

This deposit is located 80 kilometers northwest of the settlement of [illegible] have been [illegible] in [illegible] beds at 895-

1,080 meters. The pool has a layer pressure of 100 kilogram-force per square centimeter and a temperature of 30 degrees C.

The gases of the Cenomanian pool are described as follows (%):

CH_4	-- 95.0	C_3H_8	-- 0.006	N_2	-- 4.6
C_2H_6	-- 0.08	C_4H_{10} + higher	-- 0.01	CO_2	-- 0.3

The gas has a density of 0.579 relative to air. Its lowest heat of burning is 7,620 gigacalories per cubic meter and the highest is 8,460.

The Yubileynoye Deposit

This deposit is located southwest of the Urengoyskoye and east of the Messoyakhskoye deposits.

Gas pools have been identified in Cenomanian beds at depths of 1,025-1,165 meters. The layer pressure of the pool is 114 kilogram-force per square centimeter and the temperature is 32 degrees C.

The gases of this pool have the following composition (%):

CH_4	-- 98.4	C_3H_8	-- 0.005	N_2	-- 1.1
C_2H_6	-- 00.07	C_4H_{10}	-- 0.003	CO_2	-- 0.4

The gas has a density of 0.566 relative to air. Its lowest heat of burning is 7,870 gigacalories per cubic meter and the highest is 8,740.

The gases of the Northern Gas Region of the Western Siberian Lowland differ by content of methane homologues, nitrogen, and carbon dioxide. The levels of these components differ within structures (deposits) and between deposits of particular gas regions. These gases can be characterized by four average (type) compositions, shown in Table 41 below.

Table 41. Description of the Natural Gases of Deposits of the Northern Gas Region of Western Siberia

Indexes	Type of Composition I	2	3	4
Components, %				
Methane	98.0	93.8	85.9	66.2
Ethane	0.15	2.0	6.5	11.0
Propane	0.01	0.5	2.5	10.0
Butanes	0.03	0.3	1.0	6.5
Pentanes	0.002	0.14	0.3	2.2
Hexane and Higher	<0.01	0.2	0.3	1.0
Nitrogen	1.5	2.5	3.0	2.3
Carbon Dioxide	0.3	0.5	0.6	0.8
Lowest Heat of Burning, gcal/m^3	7,860	8,090	8,810	11,870
Vobbe Number, gcal/m^3	11,580	11,470	11,990	11,340

The first type characterizes the gases of the Cenomanian Stage of the Upper Cretaceous, which are widespread in the northern part of the Western Siberian platform. In Jurassic beds this type composition is common at deposits of the northwestern group.

The second type is characteristic for gases from the Valanginian Stage of the Lower Cretaceous at the Urengoyskoye, Tazovskoye, and Komsomol'skoye deposits.

The third type includes gases from the productive layers of the Upper Jurassic beds of the Urengoyskoye, Tazovskoye, and Novoportovskoye deposits and gases from the Valanginian Stage at the Novoportovskoye and Medvezh'ye deposits.

The fourth type is characteristic of gases from petroelum-gas pools of the lower productive layers of the Jurassic beds at the Medvezh'ye, Urengoyskoye, and other deposits.

The composition of natural gases changes with the depth of occurence of the productive layers at deposits. For example, the lowest level of homologues of methane at the Urengoyskoye deposit is observed in the upper packets of the Cenomanian pool and its upraised domed parts. The bottom part contains slightly more heavy hydrocarbons than the top layers.

In the Valanginian pool, which is lower, the concentration of heavy hydrocarbons increases to 3.5 percent, and in the Jurassic beds it goes from eight percent in the top horizons to 13 percent in the lower ones.

In layers where the presence of petroleum complicates the picture, the total proportion of heavy hydrocarbons reaches 28 percent.

Similar growth in the concentration of heavy hydrocarbons with depth of productive layers is observed in gases from other multilayered deposits of the Western Siberian Lowland. For example, the average level of homologues of methane in gases from the Cenomanian pool is 0.15 percent. In the beds of the Valanginian Stage their concentration in the gases reaches 11 percent, and in Jurassic beds it is 28-30 percent.

Tables 42 and 43 below give the average market characteristics of the gases of the productive layers of deposits in the Northern Region.

2. The Berezovo Group of Deposits

This group is located east of the Ural Range within the North Sos'va arch. The arch has a northeasterly trend, a length of 500-600 kilometers, and a width ranging from 20 to 250 meters.

The following gas and gas condensate deposits have been discovered in this region: Berezovskoye, Severo-Alyasovskoye and Yuzhno-Alyasovskoye, Deminskoye, Severo-Kazymskoye, Pokhromskoye, Chuel'skoye, Nizhnetugiyanskoye,

Table 42. Average Composition of Gases from Productive Layers (%)

Месторождение (a)	Отложения, ярус (b)	CO_2	CH_4	C_2H_6	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	i-C_5H_{12}	n-C_5H_{12}	C_6+ higher	N_2
(c) Уренгойское	Валанжин (j)	0,5	93,5	2,0	0,5	0,29	0,21	0,10	0,06	0,2	2,6
	Юра (k)	0,25	86,3	6,0	3,0	0,9	1,1	0,3	0,26	0,3	1,5
(d) Медвежье	Валанжин	0,40	85,4	5,0	3,5	0,65	1,0	0,35	0,33	0,4	3,0
	Юра	0,70	65,9	11,0	10,0	9,8	4,0	1,3	1,0	1,0	2,3
(e) Тазовское	Валанжин	0,5	93,5	2,1	0,3	0,06	0,06	0,06	0,05	0,1	3,2
	Юра	0,6	87,4	6,7	2,1	0,28	0,31	0,01	0,04	0,1	2,4
(f) Комсомольское	То же (k)	0,2	95,1	2,1	0,5	0,10	0,14	0,05	0,04	0,1	1,6
(g) Ново-Портовское	Валанжин	0,9	88,1	6,0	2,1	0,50	0,52	0,16	0,10	0,2	1,5
	Юра	0,5	86,6	6,5	2,5	0,40	0,15	0,12	0,10	0,1	3,0
(h) Мессояхское	То же	0,5	96,3	0,15	0,01	0,005		0,01		0,01	3,0
(i) Зимнее	Валанжин	0,3	96,9	1,2	0,03	0,02		0,01		0,01	2,5
	Юра	1,5	96,8	0,6	0,02	0,01		0,01		0,01	1,0

Key: (a) Deposit; (b) Beds, Stage; (c) Urengoyskoye; (d) Medvezh'ye; (e) Tazovskoye; (f) Komsomol'skoye; (g) Novo-Portovskoye; (h) Messoyakhskoye; (i) Zimneye; (j) Valanginian [same below]; (k) Jurassic [repeats several times].

Note: Hydrogen sulfide has not been found.

APPROVED FOR RELEASE: 2007/02/08: CIA-RDP82-00850R000100010012-6

Table 43. Average Composition of Gases from the Productive Layers of the Cenomanian in the Northern Gas Region of Western Siberia (%)

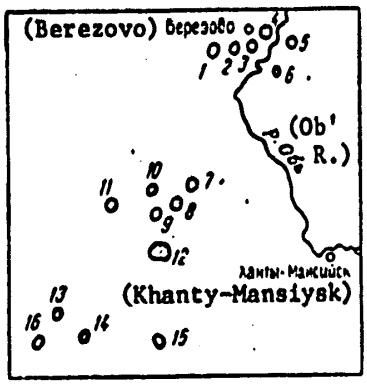
(a) Месторождение	CO_2	CH_4	C_2H_6	C_3H_8	C_4H_{10}	C_5+ higher	N_2
(b) Уренгойское	0,3	98,3	0,10	0,01	0,002	0,01	1,5
(c) Медвежье (Надинская пл.)	0,05	99,0	0,10	0,004	0,002	0,01	0,8
(d) Медвежье (пл. Медвежье)	0,3	98,1	0,20	0,004	0,002	0,01	1,3
(e) Заполярное	0,3	98,5	0,10	0,005	0,002	<0,01	1,0
(f) Тазовское	0,2	98,6	0,12	0,03	0,005	0,01	1,0
(g) Русское	0,5	99,4	0,08	0,006	0,002	<0,01	3,0
(h) Губкинское	0,15	98,4	0,13	0,01	0,005	0,01	1,3
(i) Комсомольское	0,2	97,2	0,20	0,01	0,003	0,01	2,3
(j) Айваседопуровское	0,2						2,0
(k) Пякапуровское	0,3	97,0	0,16	0,01	0,002	<0,01	2,5
(l) Вынгапуровское	0,4	95,1	0,30	0,006	0,002	0,01	4,1
(m) Мессояхское	0,6	97,6	0,10	0,03	0,005	0,01	1,6
(n) Арктическое	0,5	97,7	0,15	0,02	0,002	0,01	1,6
(o) Юбилейное	0,5	97,9	0,05	0,003	0,001	<0,01	1,5
(p) Ямбургское	0,2	98,4	0,08	0,01	0,002	0,01	1,3

Note: Hydrogen sulfide was not found.

Key: (a) Deposit;
(b) Urengoyskoye;
(b) Medvezh'ye (Nydinskaya Area);
(d) Medvezh'ye (Medvezh'ye Area);
(e) Zapolyarnoye;
(f) Tazovskoye;
(g) Russkoye;
(h) Gubkinskoye;
(i) Komsomol'skoye;
(j) Ayvasedopurovskoye;
(k) Pyakapurovskoye;
(l) Vyngopurovskoye;
(m) Messoyakhskoye;
(n) Arkticheskoye;
(o) Yubileynoye;
(p) Yamburgskoye.

Severo-Igrimskoye and Yuzhno-Igrimskoye; Paul'-Turskoye and Nulin-Turskoye, Punginskoye, Syskonsyn'inskoye, Gornoye, Shukhtungortskoye, Sote, Ozernoye, Verkhnekodinskoye, and Karabashskoye (see Figure 3 below).

Figure 3. Map of the Gas Deposits of the Western Gas Region of Western Siberia



Key: (1) Berezovskoye;
(2) Deminskoye;
(3) Yuzhno-Alyasovskoye;
(4) Severo-Alyasovskoye;
(5) Pokhromskoye;
(6) Chuel'skoye;
(7) Severo-Igrimskoye;
(8) Yuzhno-Igrimskoye;
(9) Nulin-Turskoye;
(10) Paul'-Turskoye;
(11) Syskonsyn'inskoye;
(12) Punginskoye;
(13) Gornoye;
(14) Shukhtungortskoye;
(15) Sote;
(16) Ozernoye.

The primary productive horizons have been found in beds of the Upper Jurassic and Lower Cretaceous.

The Berezovskoye Deposit

This gas deposit is located north of the settlement of Berezovo. It was discovered in 1953 and has been exploited since 1963.

The gas pool is identified in Upper Jurassic beds (Layer II) at a depth of 1,266-1,321 meters. The productive layer is composed of sandstones with grit interlayers. The initial layer pressure is 124 kilogram-force per square centimeter, and the water-gas contact occurs at 1,275 meters. Gas has also been received from layer N of the Lower Cretaceous. This horizon is somewhat less important for industrial use.

By composition the gases of the Berezovskoye deposit are classed as methane (see Table 44 below); the concentration of methane ranges from 91 to 96 percent at different wells, owing chiefly to changes in the amount of nitrogen (from 1.5 to seven percent) and homologues of methane, whose concentration increases at greater depth. These variations are insignificant, however, and for practical purposes do not alter the market description of the gases. Therefore, the average composition of gases shown in Table 45 (next page) may be adopted for the Berezovskoye deposit.

Table 44. Description of Gases from the Berezovskoye Deposit

(a) Номер скважины	(b) Интервал перфорации, м	(c) Содержание компонентов, %							(d) Плотность по воздуху	(e) Теплота сгорания, ккал/м³
		CO_2	CH_4	C_2H_6	C_3H_8	C_4H_{10}	C_5+ higher	N_2		
Нижний мел, пласт Н (f)										
8	1135,5—1130,5	0,6	91,4	0,45	0,02	0,01	0,02	7,5	0,591	7360
21	1209—1215	0,3	95,3	1,0	0,25	0,04	0,03	3,1	0,575	7810
9	1220—1224	0,3	96,1	1,1	0,27	0,04	0,03	2,1	0,571	8000
21	1234—1238	0,7	94,1	1,2	0,10	0,05	0,03	3,8	0,582	7690
Верхняя юра, пласт П (g)										
10	1276—1280	0,5	90,2	1,4	0,20	0,08	0,05	1,5	0,578	7970
18	1278—1280	0,3	94,8	1,0	0,30	0,10	0,06	3,4	0,579	7790
13	1282—1288	0,3	95,0	1,1	0,32	0,10	0,05	3,1	0,578	7820

Key: (a) Well Number;
(b) Perforation interval, meters;
(c) Components, percentage;
(d) Density Relative to Air;
(e) Heat of Burning, gigacalories per cubic meter;
(f) Lower Cretaceous, Layer N;
(g) Upper Jurassic, Layer P.

Table 45. Description of Gas from the Berezovskoye Deposit

Index	Layer N	Layer P
Components, %		
Methane	94.6	94.8
Ethane	1.1	1.2
Propane	0.25	0.30
Butanes	0.05	0.10
Pentanes+Higher	0.03	0.06
Nitrogen	3.5	3.0
CO_2	0.5	0.5
Density Relative to Air	0.585	0.585
Lowest Heat of Burning, gcal/m^3	7,790	7,860

The gas condensate extracted from gases of the Berezovskoye deposit is naphthene, low-sulfur, high-boiling condensate and has the following description:

Density 0.843
Content (%) of:
  Sulfur 0.06
  Resins and Asphaltenes 0.7
Start of Boiling (°C.) 210
Group Composition (%)
  Aromatic 5.0
  Naphthene 85.5
  Paraffin 9.5
Fraction Composition (%)
  Boil away before : 210° 60
  250° 37.7
  300° 2.3

The components of the gas, in percentages, are the following: CH_4 - 98.4; C_2H_6 - 0.07; C_2H_8 - 0.005; C_4H_{10} + higher - 0.003; N_2 - 1.1; CO_2 - 0.4.

The gas has a density of 0.566 relative to air. Its lowest heat of burning is 7,870 gigacalories per cubic meter and the highest is 8,740.

The Ayvasedopurovskoye Deposit

This deposit is located southeast of the Gubkinskoye deposit. The productive horizon has been identified in Cenomanian beds at a depth of 950-960 meters. The gas composition, in percentages, is as follows: CH_4 - 98.1; C_2H_6 - 0.06; C_3H_8 - 0.004; C_4H_{10} + higher - 0.002; N_2 - 1.5; CO_2 - 0.3.

The gas has a density of 0.565 relative to air; its lowest heat of burning is 7,850 gigacalories per cubic meter and the highest is 8,710.

A small amount of petroleum, not of industrial importance, has been received from some wells at the Berezovskoye deposit.

The petroleum is kerosene fractions with a small amount of oil-resin residue; it contains virtually no gasoline hydrocarbons.

Monocyclic and bicyclic naphthene hydrocarbons predominate in the kerosene fraction.

The Severo-Alyasovskoye and Yuzhno-Alyasovskoye Deposits

The Alyasovskiye deposits are located near the settlement of Berezovo. The southern (Yuzhno-) is 23 kilometers from town and the northern (Severo-) is 28. The deposits were discovered in 1956. They are set in the northern and northeastern parts of the Berezovo uplift zone and are composed of disconnected anticlinal folds with a northeasterly strike.

The southern uplift is 6.5 kilometers long and three kilometers wide; the northern fold is six kilometers long and two wide.

Industrially feasible gas is present at the deposits in layer P, confined to Upper Jurassic beds, and layer N, set in Goterlv-Barremian beds (Lower Cretaceous).

Productive layer P is composed of sandstones, aleurolites, and limestones; their thickness ranges from zero to 60 meters in the southern uplift and 0-27 meters in the northern structure. The thickness of the layer increases on the limbs of the structures.

At the Yuzhno-Alyasovskoye deposit productive layer P lies at a depth of 1,195-1,349 meters; at the Severo-Alyasovskoye deposit its depth is 1,265-1,345 meters.

The layer pressure at both deposits is 124-126 kilogram-force per square centimeter.

At the Yuzhno-Alyasovskoye deposit the second productive horizon N has been opened up at a depth of 1,096-1,166 meters. The layer is composed of aleurolites with interlayers of dense limestones in the lower part. Layer N has a total thickness of 27-33 meters.

The pool is a layered type with layer pressure of 112 kilogram-force per square centimeter. The water-gas contact occurs at 1,088 meters.

At the Severo-Alyasovskoye uplift layer N lies at a depth of 1,090-1,120 meters and is composed of aleurolites interstratified with limestones and argillites. Two productive pockets are singled out in this layer; they are separated by a 10-meter pocket of argillites. The average layer pressure is 112-117 kilogram-force per square centimeter. The water-gas contact occurs at 1,103 meters.

The gas pools in layer N are smaller than those of layer P.

The average composition of gases from the Severo-Alyasovskoye and Yuzhno-Alyasovskoye deposits is shown in Table 46 (next page).

Table 46. Average Composition of Gases from the Severo-Alyasovskoye and Yuzhno-Alyasovskoye Deposits

Показатели (a)	(b) Северо-Алясовское		(c) Южно-Алясовское	
	Готерив-барремские отложения, пласт Н (d)	Юрские отложения, пласт П (e)	Готерив-барремские отложения, пласт Н (d)	Юрские отложения, пласт П (e)
(f) Содержание компонентов, %				
Метан (g)	94,1	91,7	90,0	91,4
Этан (h)	0,9	1,1	0,3	1,3
Пропан (i)	0,1	0,2	0,1	0,5
Бутаны (j)	0,05	0,05	0,05	0,06
Пентан + высш. (k)	0,06	0,1	0,07	0,00
Азот (l)	4,5	6,0	9,0	6,0
Углекислый газ (m)	0,3	0,8	0,5	0,6
(n) Плотность по воздуху	0,584	0,590	0,603	0,600
(o) Теплота сгорания низшая, ккал/м³	7090	7540	7200	7040

Key: (a) Indexes;
(b) Severo-Alyasovskoye;
(c) Yuzhno-Alyasovskoye;
(d) Goteriv-Barremian Beds, Layer N;
(e) Jurassic Beds, Layer P;
(f) Components, percentage;
(g) Methane;
(h) Ethane;
(i) Propane;
(j) Butanes;
(k) Pentane + Higher
(l) Nitrogen;
(m) CO_2;
(n) Density Relative to Air;
(o) Lowest Heat of Burning, $gcal/m^3$.

The Deminskoye Deposit

This deposit is located seven kilometers northeast of the Berezovskoye deposit and is included in the Berezovo zone of uplifts of the North Sos'va arch. The deposit was discovered in 1955.

Gas presence is associated with beds of the Upper Jurassic (layer P) and Lower Cretaceous (layer N).

Productive layer P is composed of basal sandstone. The layer ranges in thickness from two meters at the arch to 37 meters on the limbs. The layer occurs at depths of 1,195-1,348 meters. The productive horizon is capped by a stratum of impermeable argillites 68-80 meters thick at the arch and 147 meters on the limbs. The water-gas contact occurs at an absolute depth of 1,275 meters. Layer pressure is 126 kilogram-force per square centimeter.

The second productive layer N, which lies higher on the cross-section, 1,068-1,132 meters, is composed of sandy-aleurolite rocks and has a total thickness of 29-34 meters. The water-gas contact lies at an absolute depth of 1,077 meters.

Gas from the Deminskoye deposit is similar in composition to gas from the Berezovskoye deposit. The concentration of components varies little by areas within the pool.

Gas from the separate layers differs in content of methane homologues and nitrogen; the lower layer P contains more of them in its gases.

The average composition gas from the productive layers of the Deminskoye deposit is given in Table 47.

Table 47. Description of Gas from the Deminskoye Deposit

Indexes	Layer N	Layer P
Components, %		
Methane	95.5	93.2
Ethane	1.0	1.3
Propane	0.3	0.4
Butanes	0.1	0.1
Pentane+ Higher	0.1	0.2
Nitrogen	2.5	4.0
CO_2	0.5	0.8

Indexes	N	P
Density Relative to Air	0.584	0.596
Lowest Heat of Burning, gcal/m^3	7,900	7,820

Note: No hydrogen sulfide has been found. Layer N is Lower Cretaceous and Layer P is Upper Jurassic

---

The Pokhromskoye Deposit

The Pokhromskoye deposit is located 38 kilometers northeast of the settlement of Berezovo. The deposit was discovered in 1960. The Pokhromskoye uplift is a brachyanticlinal latitudinal-trending fold.

Productive layer P has been identified in beds of Upper Jurassic age at a depth of 1,313-1,437 meters. It is composed of limestones and sandstones with thick aleurolite and clay interlayers. The thickness of the layer ranges from four meters at the arch to 50 meters on the limbs. The pool is 11.5 kilometers long and 4.5 wide with a gas-bearing layer of 126 meters. Initial layer pressure is 142 kilogram-force per square centimeter and the temperature is 48.8 degrees C.

The water-gas contact occurs at 1,424 meters. Gas from layer P of the Pokhromskoye deposit varies little at different wells. Its composition in given in Table 48 (next page).

The condensate content in gas from the Pokhromskoye deposit does not exceed 10-15 cubic centimeters per cubic meter of gas. The uniformity of composition of gas in the pool makes it possible to use the following average composition for consolidated calculations:

CH_4 -- 92.3
C_2H_6 -- 1.2
C_3H_8 -- 0.3
C_4H_{10} -- 0.04
C_5H_{12} -- 0.08
C_6H_{14} + higher -- 0.1
N_2 -- 5.0
CO_2 -- 1.0

Table 48. Description of Gas from Layer P of the Pokhromskoye Deposit

Показатели (a)	Скв. 76, 1311—1321 м	Скв. 75, 1360—1362 м	Скв. 74, 1365—1368 м	Скв. 78, 1414—1418 м	Скв. 97, 1421—1426 м	Скв. 79, 1438—1440 м
(b) Содержание компонентов, %						
Метан (c)	92,8	91,6	92,5	92,8	93,2	93,2
Этан (d)	1,1	1,2	1,2	1,2	1,2	1,2
Пропан (e)	0,3	0,3	0,3	0,2	0,2	0,4
Бутан (f)	0,04	0,04	0,03	0,02	0,03	0,04
Пентан (g)	0,09	0,1	0,08	0,07	0,07	0,1
Азот (h)	4,8	5,9	5,1	5,0	4,5	4,5
Двуокись углерода (i)	1,1	0,9	0,9	0,8	0,9	0,9
(j) Плотность по воздуху	0,593	0,590	0,593	0,582	0,587	0,589
(k) Теплота сгорания низшая, ккал/м³	7600	7540	7600	7650	7630	7700

Key: [Headings of the six number columns indicate the number of the particular well and then its depth.]

(a) Indexes;
(b) Components, %;
(c) Methane;
(d) Ethane;
(e) Propane;
(f) Butane;
(g) Pentane;
(h) Nitrogen;
(i) Carbon Dioxide;
(j) Density Relative to Air;
(k) Lowest Heat of Burning, gcal/m^3.

The Chuel'skoye Deposit

This deposit is located 50 kilometers southeast of the settlement of Berezovo. It was discovered in 1958. The Chuel'skoye uplift has the shape of a triangle. An isohypse is outlined along the roof of the productive layer at 1,640 meters. The structure is 12 kilometers long and six kilometers wide.

The gas-bearing layer P at the deposit is confined to beds of Upper Jurassic age. The layer occurs at 1,602-1,699 meters and is composed of aleurolites and sandstones in the lower part and shell limestone in the upper part. The thickness of the layer increases on the limbs; in the arching part it decreases until it completely tapers out. The effective thickness is 2.3-10.1 meters. Layer pressure is 167 kilogram-force per square centimeter and the water-gas contact lies at 1,628 meters.

The second gas-bearing layer, layer N, has been opened up in Goteriv-Barremian beds.

Gases from the productive layers of the Chuel'skoye deposit are classed as condensate gases and show a small amount of condensate.

The average composition of gas from the Chuel'skoye deposit, in percentages, can be described by the following figures:

CH_4	-- 92.2	C_4H_{10}	-- 0.3	N_2	-- 3.5
C_2H_6	-- 1.8	C_5H_{12}	-- 0.1	CO_2	-- 0.3
C_3H_8	-- 0.7	C_6H_{14} + higher	-- 0.1		

The gas has a density of 0.593 relative to air and its lowest heat of burning is 7,930 gigacalories per cubic meter.

The group of deposits including the Severo-Igrimskoye and Yuzhno-Igrimskoye, Nulin-Turskoye and Paul'-Turskoye, Punginskoye, and Syskonsyn'inskoye deposits lies to the southwest of the above deposits at distances of up to 220 kilometers from the settlement of Berezovo.

3. The Igrim Group of Deposits

The Severo-Igrimskoye and Yuzhno-Igrimskoye Deposits

The Severo [North] Igrimskoye deposit is 95 kilometers southwest of the settlement of Berezovo; the Yuzhno [South] Igrimskoye deposit is to the southwest of it, separated by a small trough.

The Severo-Igrimskoye uplift is a brachyanticlinal northeasterly-striking fold 7.5 kilometers long and three wide on the roof of the productive layer. The Yuzhno-Igrimskoye deposit is six kilometers square.

Productive layer P contains gas at the Igrim deposits.

At the Severo-Igrimskoye uplift the productive layer occurs at a depth of 1,582-1,650 meters. The initial layer pressure is 165-170 kilogram-force per square centimeter.

The gas from the Igrim deposits is similar in composition to gas from layer P at the other deposits of the Berezovo group considered above (see Table 49, next page).

The Paul'-Turskoye and Nulin-Turskoye Deposits

These deposits are located 100 kilometers southwest of the settlement of Berezovo, five and four kilometers respectively to the west of the Yuzhno-Igrimskoye deposit.

The Paul'-Turskoye and Nulin-Turskoye uplifts are brachyanticlinal folds with dimensions of 3.5×3.5 kilometers and 4.5×2.2 kilometers respectively. Gas presence at these deposits has been established in Upper Jurassic beds. The depth of the gas-bearing layer is 1,600-1,654 meters and the initial layer pressure is 161-164 kilogram-force per square centimeter.

Table 49. Description of Gas from the Igrim Deposits

Показатели (a)	Северо-Игримское месторождение (b)	Южно-Игримское месторождение (c)	Показатели (a)	Северо-Игримское месторождение (b)	Южно-Игримское месторождение (c)
(d) Содержание компонентов, %					
Метан (e)	94,0	95,2	Гомологи + высшие (j)	0,2	0,1
Этан (f)	1,6	1,5	Азот (k)	3,0	2,0
Пропан (g)	0,6	0,5	Двуокись углерода (l)	0,5	0,3
Бутан (h)	0,4	0,3	Плотность по воздуху (m)	0,605	0,588
Пентан (i)	0,2	0,1	Теплота сгорания низшая, ккал/м³ (n)	8140	8080

Key: (a) Indexes;
(b) Severo-Igrimskoye;
(c) Yuzhno-Igrimskoye;
(d) Components, %;
(e) Methane;
(f) Ethane;
(g) Propane;
(h) Butane;
(i) Pentane;
(j) Hexane and Higher;
(k) Nitrogen;
(l) Carbon Dioxide;
(m) Density Relative to Air;
(n) Lowest Heat of Burning, gigacalories per cubic meter.

Table 50 below shows that the gases of the Paul'-Turskoye and Nulin-Turskoye deposits are similar in composition.

Table 50. Description of Gas [sic]

Indexes	Paul'-Turskoye	Nulin-Turskoye
Components, %		
Methane	94.2	94.2
Ethane	1.3	1.2
Propane	0.4	0.3
Butane	0.1	0.1
Pentane + Higher	0.1	0.1
Nitrogen	3.7	3.8
CO_2	0.2	0.3

Indexes	P-T	N-T
Density Relative to Air	0.557	0.589
Lowest Heat of Burning, gcal/m^3	7,860	7,830

The Punginskoye Deposit

The Punginskoye gas condensate deposit is located 40 kilometers south of the settlement of Igrim. It was discovered in 1961.

The Punginskoye uplift is a northeasterly-trending brachyanticlinal fold 11.5 kilometers long by 9.5 wide on the roof of the productive horizon.

Layer P at the Punginskoye deposit contains gas. The productive horizon lies at 1,672-1,900 meters and is composed of crag in the upper part and sandstone and gritstone in the lower part. The thickness of the layer is irregular, raging from 80 to 150 meters in the arched parts and 3.4-12.4 meters in the limbs. The gas pool is small in dimensions and has a layer pressure of 179 kilogram-force per square centimeter.

Table 51 below shows that the gases of the Punginskoye deposit contain a small amount of condensate, and traces (less than 0.0001 percent) of hydrogen sulfide has been detected.

Table 51. Composition of Gases from the Punginskoye Deposit, Layer P, Upper Jurassic

Компоненты (a)	(b) Номер скважины						
	211	212	239	235	234	516	243
Метан (c)	94,7	94,6	92,8	94,4	94,6	93,3	93,9
Этан (d)	2,2	2,1	1,7	2,1	2,2	2,5	2,3
Пропан (e)	0,3	0,3	0,4	0,3	0,4	0,5	0,4
Бутан (f)	0,15	0,17	0,15	0,2	0,12	0,3	0,2
Пентан (g)	0,07	0,06	0,06	0,08	0,10	0,35	0,1
Гексан + высшие (h)	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Азот (i)	2,1	2,3	2,3	2,5	2,0	2,2	2,1
Углекислый газ (j)	0,4	0,4	0,5	0,3	0,5	0,8	0,8

Key: (a) Components; (e) Propane; (i) Nitrogen;
(b) Well Number; (f) Butane; (j) CO_2.
(c) Methane; (g) Pentane;
(d) Ethane; (h) Hexane+ Higher;

The average composition of gas from the Punginskoye deposit is:

CH_4 -- 93.8 $n\text{-}C_4H_{10}$ -- 0.21
C_2H_6 -- 2.3 $i\text{-}C_5H_{12}$ -- 0.19
C_3H_8 -- 0.4 N_2 -- 2.2
$i\text{-}C_4H_{10}$ -- 0.13 C_6H_{14} + higher -- 0.1 CO_2 -- 0.5

The average density of the gas relative to air is 0.594 and its lowest heat of burning is 8,160 gigacalories per cubic meter.

Gas from the Punginskoye deposit is put through low-temperature separation and delivered to the Igrim -- Serov pipeline.

The composition of the gas entering the pipeline is the following:

CH_4 -- 95.0 $i\text{-}C_4H_{10}$ -- 0.06 $n\text{-}C_5H_{12}$ -- 0.02
C_2H_6 -- 2.3 $n\text{-}C_4H_{10}$ -- 0.05 N_2 -- 2.6
C_3H_8 -- 0.35 $i\text{-}C_5H_{12}$ -- 0.05 CO_2 -- 0.2

The density of the gas relative to air is 0.584 and the lowest heat of burning is 8,040 gigacalories per cubic meter.

The Syskonsyn'inskoye Deposit

This deposit is located southwest of the Nulin-Turskoye deposit and 220 kilometers from the settlement of Berezovo. It has three distinct gas pools confined to the east, south, and west Syskonsyn'inskoye local uplifts, which are classified as the Syskonsyn'inskoye group. The east uplift is 12 kilometers long and five wide, while the west one is 10 long and five wide, and the south uplift is nine kilometers long and 4.5 wide.

At the Syskonsyn'inskoye deposit layer P of the Upper Jurassic and the weathering crust of the Paleozoic basement contains gas. Productive layer P is composed of argillaceous sandstones with interstratified clays, aleurolites, and argillites. It occurs at a depth of 1,530-1,580 meters and has an initial layer pressure of 152-155 kilogram-force per square centimeter.

The gases of the Syskonsyn'inskoye deposit have the following composition:

CH_4	-- 95.5	C_4H_{10}	-- 0.2	C_6H_{14} + higher	-- 0.1
C_2H_6	-- 1.3			N_2	-- 2.0
C_3H_8	-- 0.4	C_5H_{12}	-- 0.1	CO_2	-- 0.4

The gas has a density of 0.586 relative to air and its lowest heat of burning is 8,020 gigacalories per cubic meter.

The Gornoye Deposit

This deposit was discovered in 1962. It is located 190 kilometers southwest of the settlement of Berezovo. It is a brachyanticlinal fold 13 kilometers long and 3.5 wide. Gas presence has been established in Jurassic beds and beds of the weathering crust.

The productive layer lies at a depth of 1,686-1,785 meters and is composed of sandstones with aleurolite interlayers. The effective thickness of the layer reaches 26 meters, and it has an initial layer pressure of 160 kilogram-force per square centimeter. The water-gas contact stands at 1,590 meters.

Gas from the Gornoye deposit has the following average composition (in percentages):

CH_4	-- 96.2	C_4H_{10}	-- 0.3	C_6H_{14} + higher	-- 0.1
C_2H_6	-- 1.1	C_5H_{12}	-- 0.16	CO_2	-- 0.2
C_3H_8	-- 0.7				

The gas has a density of 0.585 relative to air, and its lowest heat of burning is 8,160 gigacalories per cubic meter.

The Shukhtungortskoye Deposit

This deposit is located in the Berezovo region, 12 kilometers west of the settlement of Shukhtungort. Jurassic beds and the weathering crust, joined into a single productive layer at a depth of 1,666-1,790 meters, contain the gas. This layer is composed of sandstones with interlayers of crag and, in the lower part, quartz schists. The layer has an effective thickness of up to 16 meters.

The deposit consists of several independent pools confined to distinct arches. The largest pool occurs in the southeast arch of the structure.

The initial layer pressure in the pool is 168 kilogram-force per square centimeter. The water-gas contact lies at 1,683 meters.

The composition of the gas from the Shukhtungortskoye deposit does not differ significantly from the gases of other deposits of the Berezovo-Igrim gas region. It is a methane gas with small amounts of methane homologues and gas condensate fractions of hydrocarbons.

The composition of gas from the Shukhtungortskoye deposit, in percentages, is given below:

CH_4 -- 95.1	C_4H_{10} -- 0.4	N_2 -- 1.4
C_2H_6 -- 1.6	C_5H_{12} + higher -- 0.2	CO_2 -- 0.8
C_3H_8 -- 0.5		

The gas has a density of 0.601 and its lowest heat of burning is 8,110 gigacalories per cubic meter.

The Sote Deposit

This deposit is located 20 kilometers east-southeast of the settlement of Shukhtungort. It consists of two uplifts, the Southern and Northern, with dimensions of 6×3 and 6.5×4.0 kilometers respectively.

The Jurassic beds at the deposit contain gas. Gas has been received from a depth of 2,062-2,179 meters. The productive beds are composed of a fine alternation of sandstones, aleurolites, and argillites. The initial layer pressure is 186-191 kilogram-force per square centimeter.

The average composition of gas from the deposit, in percentages, is:

CH_4 -- 96.7	C_4H_{10} -- 0.1	N_2 -- 1.4
C_2H_6 -- 1.0	C_5H_{12} + higher -- 0.1	CO_2 -- 0.3
C_3H_8 -- 0.4		

The gas has a density of 0.578 relative to air and its lowest heat of burning is 8,020 gigacalories per cubic meter.

The Ozernoye Deposit

The Ozernoye uplift is located 25 kilometers southwest of the settlement of Shukhtungort. It is a brachyanticlinal meridional-trending fold six kilometers long and 4.5 wide. The fold has two arches separated by a trough.

Jurassic beds and rocks of the weathering crust at the deposit contain gas. The productive layer lies at a depth of 1,636-1,759 meters and is composed of sandstones with crag interlayers. The layer is 2-14.6 meters thick with an initial layer pressure of 159,7 kilogram-force per square centimeter. The water-gas contact lies at 1,560 meters.

The gas from the Ozernoye deposit has the following composition, in percentages:

CH_4 -- 94.7	C_4H_{10} -- 0.3	N_2 -- 3.0
C_2H_6 -- 1.0	C_5H_{12} + higher -- 0.2	CO_2 -- 0.4
C_3H_8 -- 0.4		

The gas has a density of 0.589 relative to air and a lowest heat of burning of 7,950 gigacalories per cubic meter.

The Verkhnekondinskoye Deposit

The Verkhnekondinskoye uplift is located in Kondinskiy Rayon of the Khanty-Mansiysk Autonomous District, 270 kilometers northwest of the city of Khanty-Mansiysk. It is a triangularly-shaped brachyanticlinal fold.

Industrially feasible gas at the deposit is confined to the Oxford beds of the Upper Jurassic (Layer P) and the rocks of the weathering crust of the Paleozoic basement. Productive layer P lies at a depth of 1,830-1,890 meters. It is composed of sandstones with argillaceous carbonate-calcium cement. The pool is 7.5 kilometers long and five wide.

The total thickness of the layer runs from zero to 27 meters. Layer pressure is 180 kilogram-force per square centimeter. The water-gas contact lies at 1,783 meters.

The productive beds of the weathering crust are fractured rocks. The pool is 7.2 kilometers long and four wide. Layer pressure is 180 kilogram-force per square centimeter and the pool has a temperature of 67 degrees C.

The gases of the Verkhnekondinskoye deposit have the following composition, in percentages:

CH_4 -- 94.2	C_4H_{10} -- 0.2	N_2 -- 3.0
C_2H_6 -- 1.2	C_5H_{12} + higher	CO_2 -- 0.8
C_3H_8 -- 0.4		

The gas has a density of 0.592 relative to air and its lowest heat of burning is 7,890 gigacalories per cubic meter.

The Karabashkoye Deposit

This deposit is located 162 kilometers northeast of the city of Tyumen', in a dome-like fold that extends from the northwest to the southeast.

Industrially feasible gas has been received from the weathering crust of the basement at a depth of 1,682-1,696 meters.

The layer pressure is 173 kilogram-force per square centimeter and the temperature is 75 degrees C. Gas from this deposit, classed as a methane gas, has the following composition (in percentages):

CH_4 -- 97.9	C_4H_{10} -- 0.25	C_6H_{14} + higher -- 0.20
C_2H_6 -- 0.6	C_5H_{12} -- 0.18	N_2 -- 0.5
C_3H_8 -- 0.35		

The gas has a density of 0.577 relative to air and its lowest heat of burning is 8,190 gigacalories per cubic meter.

Summarizing data on the composition of gases from deposits located in the Western (Berezovo) Gas Region of Tyumenskaya Oblast, we learn that:

a. The gases of this region are classified as methane gases with a low (to one percent) CO_2 content and no hydrogen sulfide;

b. Within the particular deposits, the composition of the gases varies little and can be described by the same average figures.

The average compositions of gases from deposits of the Western Gas Region are given in Table 52 (next page).

IV. Tomskaya Oblast

A large number of petroleum deposits have been discovered in Tomskaya Oblast; gas condensate deposits and pools have also been found.

The petroleum and gas presence of Tomskaya Oblast in associated with beds of the Cretaceous and Jurassic and the weathering crust of the basement.

The chief explored gas reserves are confined to the Tyumen' Series (layer Yu-II) of the Middle Jurassic and the Vasyugan Series (layer Yu-I) of the Upper Jurassic. Gas pools have also been identified in the Lower Cretaceous horizon.

Descriptions are given below of the composition of gases from the gas condensate deposits of Luginetskoye, Myl'dzhinskoye, Severo-Vasyuganskoye, and Ust'-Sil'ginskoye.

Table 52. Description of Gases from Deposits of the Western Gas Region

Месторождение (a)	Отложения, пласт (b)	(c) Содержание компонентов, %								(d) Плотность по воздуху	(e) Теплота сгора-ния низшая/высшая
		CO_2	CH_4	C_2H_6	C_3H_8	C_4H_{10}	C_4H_{10}	C_5+ высшие	N_2		
(f) Березовской группы месторождений											
Березовское (g)	Юрские Н	0,5	94,8	1,1	0,25	0,05	0,03	0,1	3,5	0,589	7850
	Юрские П	0,5	95,7	1,2	0,30	0,10	0,05	0,1	3,0	0,583	7890
Демьянское (h)	Юрские Н	0,5	95,4	1,0	0,10	0,10	0,10	0,1	2,5	0,586	7930
	Юрские П	0,8	93,1	1,3	0,10	0,10	0,10	0,15	4,0	0,591	7850
Северо-Алясовское (i)	Юрские Н	0,3	94,0	0,9	0,10	0,05	0,05	0,10	4,5	0,588	7760
	Юрские П	0,8	91,6	1,1	0,20	0,05	0,10	0,12	6,0	0,601	7800
Южно-Алясовское (j)	Юрские Н	0,5	89,9	0,3	0,10	0,05	0,07	0,10	9,0	0,605	7330
	Юрские П	0,6	91,3	1,3	0,30	0,06	0,05	0,15	6,6	0,602	7640
Похромское (k)	Юрские П	1,0	92,3	1,2	0,30	0,05	0,08	0,10	5,0	0,600	7690
Северо-Казымское (l)	Юрские Н	0,5	93,3	1,3	0,50	0,15	0,09	0,14	4,0	0,597	7870
Чузьинское (m)	Верхняя юра П (y)	0,3	93,1	1,8	0,70	0,30	0,10	0,15	3,5	0,600	7820
(n) Игримской группы месторождений											
Северо-Игримское (o)	Юрские П	0,5	93,6	1,6	0,6	0,40	0,10	0,20	3,0	0,600	8060
Южно-Игримское (p)	Юра П	0,3	94,6	1,5	0,5	0,30	0,10	0,15	2,6	0,591	8010
Пауль-Турское (q)	(z) То же	0,26	94,1	1,3	0,4	0,10	0,05	0,10	3,7	0,588	7974
Нудин-Турское (r)	"	0,30	94,2	1,2	0,30	0,10	0,04	0,10	3,8	0,589	7840
Пунгинское (s)	"	0,50	93,8	2,3	0,60	0,40	0,30	0,20	2,0	0,601	8020
Сыскомендыпское (t)	"	0,50	93,3	1,1	0,50	0,20	0,10	0,10	2,0	0,588	8020
Горное (u)	"	0,20	96,2	1,1	0,70	0,30	0,15	0,10	1,2	0,585	8160
Озерное (v)	"	0,40	94,6	1,0	0,50	0,30	0,16	0,10	3,0	0,591	7960
Шухтунгурское (w)	"	0,80	95,1	1,0	0,50	0,10	0,07	0,10	1,4	0,593	8110
Сота (aa)	"	0,30	96,5	1,0	0,10	0,10	0,06	0,10	1,4	0,579	8020
Верхне-Кондинское (x)	"	0,80	94,2	1,2	0,10	0,20	0,05	0,10	3,0	0,591	7800

Key: (a) Deposits;
(b) Beds, Layer [all are Jurassic; letter "H" is "Layer N" and "П" is "Layer P"];
(c) Components, percentage;
(d) Density Relative to Air;
(e) Lowest Heat of Burning, gcal/m^3;
(f) Berezovo Group of Deposits;
(g) Berezovskoye;
(h) Deminskoye;
(i) Severo-Alyasovskoye;
(j) Yuzhno-Alyasovskoye;
(k) Pokhromskoye;
(l) Severo-Kazymskoye;
(m) Chel'skoye;
(o) Severo-Igrimskoye;
(p) Yuzhno-Igrimskoye;
(q) Paul'-Turskoye;
(r) Nulin-Turskoye;
(s) Punginskoye;
(t) Syskonsyn'inskoye;
(u) Gornoye;
(v) Ozernoye;
(w) Shukhtungurskoye;
(x) Verkhne-Kondinskoye;
(y) Upper Jurassic Layer P;
(z) The Same [as above].
(aa) Sote.

The Luginetskoye Deposit

The Luginetskoye gas condensate deposit is located in the southwestern part of Tomskaya Oblast, 100 kilometers northwest of the settlement of Pudino. The deposit is confined to a northeasterly-striking anticlinal fold.

Industrially feasible gas condensate pools have been indentified in beds of the Upper Jurassic, layer Yu-I-III. This layer encompasses the sandy-aleurolite rocks of the Vasyugan Series (Yu-I) and the Tyumen' Series (Yu-II-III).

The roof of layer Yu-I-III was opened up at the depth interval 2,260-2,352 meters. Layer pressure is 240-244 kilogram-force per square centimeter. The pool has a high gas condensate factor (more than 140 cubic centimeters per cubic meter).

Petroleum has been found in the lower part of the layer. The composition of gas from the Luginetskoye deposit shows a relative small amount of ethane (about 3.5 percent), a relatively high amount of propane (up to three percent), about 1.5 percent butanes, up to one percent pentanes and higher molecular hydrocarbons.

The gases contain a relatively small amount of CO_2 (o.5 percent) and nitrogen (about 2.5 percent).

The composition of gases from the Luginetskoye deposit changes little within the pool; a slightly higher content of heavy hydrocarbons has been found in the petroleum zones. The gases of this deposit may be described by the following average figures, in percentages:

CH_4 -- 85.9	C_4H_{10} -- 1.7	N_2 -- 2.5
C_2H_6 -- 4.0	C_5H_{12} -- 1.0	CO_2 -- 0.8
C_3H_8 -- 3.0	C_6H_{14} + higher -- 0.4	

The gas has a density of 0.700 relative to air and its lowest heat of burning is 8,400 gigacalories per cubic meter.

The Myl'dzhinskoye Deposit

This is a gas condensate deposit located 40 kilometers south of the town of Sredniy Vasyugan.

The Myl'dzhinskoye deposit is confined to the uplift of the same name. It is a northeasterly-striking anticlinal fold.

Industrially feasible gas is found in beds of the Cretaceous and Upper Jurassic. The layers are identified in Cretaceous sediments: B-VIII and B-X in the Kulomzinskaya Series of the Valanginian and B-XVI to XX in the Achimovskaya Subseries of the Lower Valanginian

In the Upper Jurassic beds layer Yu-I of the Tyumen' Series and layer Yu-II in the Vasyugan Series are combined into layer Yu-I-II.

Layer B-III lies at 2,080-2,100 meters. It is a gas condensate pool with a layer pressure of 208 kilogram-force per square centimeter and a temperature of 67 degrees C.

Layer B-X lies at 2,140-2,240 meters and is composed of sandstones and aleurolites interstratified with argillites. It is found only in the northern part of the structure. The pool is a gas condensate type with layer pressure of 228 kilogram-force per square centimeter.

Layer B-XVI-XX lies at depths of 2,200-2,380 meters and is composed of sandstones and aleurolites with interlayers of argillites. It is traced in the northern part of the structure. The layer pressure in the pool is 237 kilogram-force per square centimeter and the temperature is 71 degrees C. It is a gas condensate pool with up to 100 cubic centimeters of condensate per cubic meter.

Layer Yu-I-II lies at a depth of 2,334-2,470 meters. The layers are composed of fine and medium grained sandstones. This is a gas condensate pool with layer pressure of 256 kilogram-force per square centimeter and a temperature of 80 degrees C.

The gases of the Cretaceous and Jurassic beds of the Myl'dzhinskoye deposit differ little in composition. A characteristic feature of them is that the concentration of propane is slightly higher than that of ethane. This is true of gases from most of the deposits of Tomskaya Oblast, which distinguishes them from gases from gas condensate pools in most regions of the country. A description of the horizons of the Myl'dzhinskoye deposit is given in Table 53 (next page).

The Severo-Vasyuganskoye Deposit

This gas condensate deposit is located 520 kilometers northwest of the city of Novosibirsk.

The deposit occurs in a dome-like uplift. Beds of the Upper Jurassic (layer Yu-I) and the Middle Jurassic (layer Yu-II) contain industrially feasible gas at this deposit.

Layer Yu-I lies at a depth of 2,270-2,350 meters and is composed of sandstones, aleurolites, and argillites. It is a gas condensate pool with a high (up to 240 cubic centimeters per cubic meter) concentration of condensate. The initial layer pressure in the pool is 244 kilogram-force per square centimeter.

Layer Yu-II is composed of alternating sandstones, aleurolites, and argillites. It is a gas condensate pool also.

Pools Yu-I and Yu-II are being exploited together. Gases from the gas condensate pool of the Severo-Vasyuganskoye deposit have a high level of methane homologues and are very valuable for receiving liquified propane-butane gases for the extraction of ethane and gaseous benzines

Table 53. Composition of Gases from the Myl'dzhinskoye Deposit (%)

Горизонт (a)	Номер скважины (b)	Глубина, м (c)	CO_2	CH_4	C_2H_6	C_3H_8	$i\text{-}C_4H_{10}$	$n\text{-}C_4H_{10}$	$i\text{-}C_5H_{12}$	$n\text{-}C_5H_{12}$	C_6+ higher	N_2
(d) Меловые отложения												
B-VIII	1	2088—2093	0,5	85,6	3,5	4,3	0,75	0,70	0,6	0,5	0,1	3,5
B-X	3	2146—2174	0,4	87,7	3,0	3,3	0,8	0,8	0,7	0,65	0,2	2,5
B-XVI	4	2261—2274	0,3	85,9	3,8	3,4	0,65	0,60	0,80	0,6	0,3	3,6
(e) Юрские отложения												
Yu -I—II	1	2344—2400	0,4	88,1	3,4	2,6	0,50	0,40	0,30	0,20	0,1	4,0
Yu -I—II	2	2389—2455	1,0	83,4	3,9	5,4	0,70	0,65	0,40	0,35	0,3	3,4
Yu -I—II	10	2377—2471	1,7	53,1	5,9	11,3	7,7	8,1	4,6	3,1	1,3	3,2
Yu -I—II	44	2395—2423	1,4	71,6	8,0	7,0	3,0	3,1	0,5	0,4	1,0	4,0

Key: (a) Horizon;
(b) Well Number;
(c) Depth, meters;
(d) Cretaceous Beds;
(e) Jurassic Beds.

APPROVED FOR RELEASE: 2007/02/08: CIA-RDP82-00850R000100010012-6

Light petroleum products and diesel fuels are produced from the condensates.

Special features of the composition of gases from the Severo-Vasyuganskoye deposit are the fact that the concentration of propane exceeds that of ethane and that they contain a somewhat larger amount of CO_2.

The average composition of gases from the gas condensate pool of the Severo-Vasyuganskoye deposit is as follows (in percentage):

CH_4 -- 76.0	$n\text{-}C_4H_{10}$ -- 2.0	C_6H_{14} + higher -- 0.8
C_2H_6 -- 5.8	$i\text{-}C_5H_{12}$ -- 1.0	N_2 -- 3.3
C_3H_8 -- 6.0	$n\text{-}C_5H_{12}$ -- 0.8	CO_2 -- 2.5
$i\text{-}C_4H_{10}$ -- 2.0		

The Ust'-Sil'ginskoye Deposit

This gas condensate deposit is located in the southwestern part of Tomskaya Oblast, 40 kilometers southwest of the town of Kargasok. It is confined to the Ust'-Sil'ginskaya and Sredne-Sil'ginskaya local structures and comprises a northeasterly-trending anticlinal fold. The fold has two independent uplifts, the eastern and western.

Gas is found in Jurassic beds at the deposit. Productive layer Yu-I-II has been identified at a depth of 2,240-2,310 meters. The layer is composed of alternating interlayers of sandstones, aleurolites, argillites, and clays. It is a gas condensate deposit with a layer pressure in the pool of 248 kilogram-force per square centimeter and a temperature of 87 degrees C.

The average composition of the gas condensate pool of the Ust'-Sil'ginskoye deposit in percentages is as follows:

CH_4 -- 87.6	$n\text{-}C_4H_{10}$ -- 0.6	C_6H_{14} + higher -- 0.3
C_2H_6 -- 3.0	$i\text{-}C_5H_{12}$ -- 0.3	N_2 -- 3.0
C_3H_8 -- 3.7	$n\text{-}C_5H_{12}$ -- 0.2	CO_2 -- 1.0
$i\text{-}C_4H_{10}$ -- 0.64		

11,176
CSO: 8144/0424

FUELS AND RELATED EQUIPMENT

UDC 622.321(03)

CHIEF GAS DEPOSITS OF CENTRAL ASIA

Moscow PRIRODNYYE GAZY MESTOROZHDENIY SOVETSKOGO SOYUZA in Russian 1978 signed to press 10 Mar 78 pp 104-118

[Section "Characteristics of Natural Gases" from the book "Prirodnyye Gazy Mestorozhdeniy Sovetskogo Soyuza" (Natural Gases of the Deposits of the Soviet Union) by A. K. Karpov and N. V. Raaben, Izdatel'stvo Nedra, Moscow, 5,300 copies, 320 pages]

[Text] The Deposits of Central Asia

A large number of gas, gas condensate, and petroleum-gas deposits have been discovered in Central Asia in the Turkmen, Uzbek, and Tadzhik republics and in Western Kazakhstan.

Many of them are located in the Central Asian and Karakumy platforms.

Industrially feasible gas presence in Central Asia has been established for the strategic [sic] complex from Permian-Triassic to Neogenic beds.

The main gas deposits are associated with Mesozoic beds of the Central Asian platform. Gas pools have been discovered in Neogenic, Cretaceous, and Jurassic formations.

The Deposits of Turkmenistan

The deposits are grouped into the northeastern and central* gas regions according to territorial, in particular geological, structure and the nature of gas and petroleum presence.

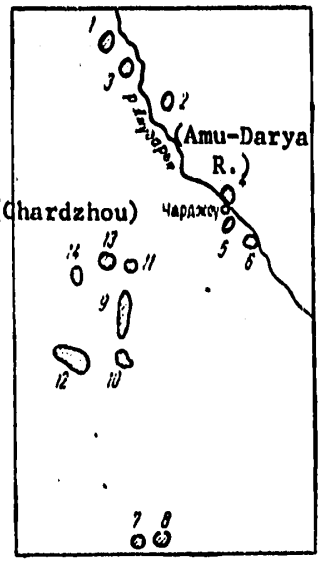
The groups of petroleum and gas deposits discovered in the West Turkmen intermontane trough are singled out as the western* region of Turkmenistan (see Figure 6, next page).

The large Achakskoye, Gugurtlinskoye, and Naip deposits have been discovered and are being worked in this region of Turkmenistan.

---

* [Here and in ensuing discussion directional names appear confused; they have been translated exactly as printed -- trans.]

Figure 6. Map of the Location of the Gas Deposits of the Turkmen SSR



Key: (1) Achakskoye;
(2) Gugurtlinskoye;
(3) Naip;
(4) Farab;
(5) Sakar;
(6) Samantepe;
(7) Islim;
(8) Karachop;
(9) Bayramali;
(10) Mayskoye;
(11) Sharapli;
(12) Shatlyk;
(13) Kali;
(14) Yelanskoye.

[Nos 1-3 are headed "Northern Region" and Nos 4-14 "Eastern Region"; see footnote to previous page.]

Industrially feasible gas in the northern region of Turkmenistan occurs in Lower Cretaceous and Jurassic beds. The cross-section of these beds contains a large number of gas and gas condensate pools.

The gas-bearing horizons are composed primarily of terrigenous traps. Only the Upper Jurassic horizons are made up of limestones.

The Achakskoye Deposit

The Achakskoye gas condensate deposit is located 60 kilometers southeast of the city of Urgench

Middle and Upper Jurassic, Cretaceous, Paleogenic, and Neogenic beds participate in the geological structure of the deposit. The structure is a large anticline trending from southwest to northeast. The fold is 25 kilometers long and eight wide. The northwest limb of the structure is made complex by tectonic dislocations. The Achakskoye deposit has several layers. Industrially feasible pools of gas have been identified in beds of the Lower Cretaceous and Upper and Middle Jurassic. The Cretaceous and Jurassic beds are composed of sandstones with clay-aleurolite interlayers.

The gas-bearing horizons lie in the depth interval 1,450-2,200 meters. The total thickness of the individual horizons ranges from 15 to 75 meters.

Table 61. Compositions of Gases from Productive Layers of the Achakskoye Deposit (%)

Горизонт (a)	Номер скважины (b)	Глубина, м (c)	CO_2	CH_4	C_2H_6	C_3H_8	$i\text{-}C_4H_{10}$	$n\text{-}C_4H_{10}$	$i\text{-}C_5H_{12}$	$n\text{-}C_5H_{12}$	C_6+ высшие	N_2
(d) Нижнемеловые, апт												
IIa	14	1565—1610	0,3	93,3	3,9	1,0	0,17	0,19	0,07	0,05	0,08	0,9
IIб	209	1622—1674	0,3	93,6	3,9	0,92	0,16	0,18	0,07	0,05	0,07	0,7
IIa + б	2	1546—1661	0,3	93,0	4,0	1,10	0,16	0,18	0,10	0,08	0,10	1,0
III	1037	1621—1647	0,4	93,5	3,9	0,92	0,16	0,19	0,07	0,05	0,10	0,7
III	13	1625—1650	0,3	92,7	4,1	1,1	0,20	0,20	0,09	0,06	0,10	1,1
(e) Нижнемеловые, неоком												
IVб	1	1750—1769	0,2	93,9	3,8	0,90	0,15	0,16	0,08	0,05	0,10	0,6
IVб	5	1739—1773	0,3	93,3	3,8	0,91	0,15	0,17	0,07	0,04	0,16	1,1
IVa + б	202	1702—1784	0,2	94,0	3,8	0,85	0,16	0,19	0,10	0,07	0,15	0,5
Va	10	1913—1938	0,2	93,6	3,7	1,12	0,20	0,27	0,15	0,12	0,12	0,5
Va	6	1856—1935	0,2	93,0	3,8	1,21	0,16	0,21	0,10	0,09	0,16	1,0
Vб	1	1941—1946	0,3	93,1	3,8	1,14	0,16	0,20	0,08	0,07	0,17	1,0
Va + б	300		0,4	93,0	3,8	1,10	0,17	0,21	0,10	0,09	0,15	1,0
(f) Верхнеюрские, кимеридж												
VIa	6	1995—2005	0,3	91,6	3,8	1,21	0,16	0,18	0,08	0,05	0,12	2,5
(g) Верхнеюрские, келловей												
IX	504		0,5	89,2	4,4	1,6	0,24	0,25	0,08	0,06	0,24	3,5
IX	7	2123—2140	0,5	89,3	4,6	1,5	0,23	0,20	0,10	0,07	0,20	3,3
IX	502		0,3	90,6	4,1	1,3	0,21	0,23	0,08	0,06	0,10	3,0
X	7	2151—2191	0,7	88,8	4,7	1,6	0,23	0,21	0,10	0,07	0,22	3,4

Key: (a) Horizon;
(b) Well Number;
(c) Depth, meters
(d) Lower Cretaceous, Aptian;
(e) Lower Cretaceous, Neocomian;
(f) Upper Jurassic, Kimmeridgian;
(g) Upper Jurassic, Callovian.

The initial layer pressure varied with depth from 166 to 231 kilogram-force per square centimeter and temperature runs from 74 to 92 degrees C.

Gas from the productive layers of the Achakskoye deposit can be classified as hydrocarbon-methane gas with low levels of CO_2 and nitrogen (see Table 61, next page). The content of these components increases with the depth of the productive layers.

Horizons IX and X of the Upper Jurassic contain the most nitrogen (up to 3-4 percent) and CO_2 (to 0.6 percent).

The content of methane homologues also increases with depth. There is no hydrogen sulfide in the gases.

The content of stable condensate in gases from the Achakskoye deposit ranges from 14 to 30 cubic centimeters per cubic meter.

Two average compositions can be used to describe the natural gases of this deposit:

1. one for the gases of horizons II, III, IV, and V of the Lower Cretaceous beds;

2. one for horizons IX and X of the Jurassic beds.

The average compositions of gases from the Lower Cretaceous and Jurassic bed are shown in Table 62 below.

Table 62. Description of Gases from the Cretaceous and Jurassic Beds of the Achakskoye Deposit (Group 1 is Lower Cretaceous horizons II, III, IV, and V; Group 2 is Jurassic horizons IX and X)

Indexes	Group 1	Group 2
Components, %		
Methane	93.7	89.2
Ethane	3.8	4.6
Propane	0.9	1.5
iso-Butane	0.17	0.23
n-Butane	0.20	0.21
iso-Pentane	0.08	0.10
n-Pentane	0.06	0.07
Hexane + Higher	0.10	0.20

Indexes	Group 1	Group 2
Nitrogen	0.7	3.3
Carbon Dioxide	0.3	0.5
Density Relative to Air	0.601	0.627
Heat of Burning, gcal/m^3 -Lowest	8,410	8,360
Highest	9,320	9,250
Vobbe Number, gcal/m^3	12,023	11,682

Gas is processed at the Achakskoye deposit in low-temperature separation and diethylene glycol drying units.

The market gas delivered from the fields to the pipeline has the following composition (in percentage):

CH_4	-- 93.4	$n\text{-}C_4H_{10}$	-- 0.15	C_6H_{14} + higher	- 0.02
C_2H_6	-- 4.2	$i\text{-}C_5H_{12}$	-- 0.06	N_2	-- 0.9
C_3H_8	-- 0.8	$n\text{-}C_5H_{12}$	-- 0.04	CO_2	-- 0.3
$i\text{-}C_4H_{10}$	- 0.14				

The gas has a density of 0.600 relative to air. Its lowest heat of burning is 8,360 gigacalories per cubic meter and the highest is 9,260. Its Vobbe number is 11,955 gigacalories per cubic meter.

The Gugurtlinskoye (Gugurtli) Deposit

The Gugurtlinskoye gas condensate deposit is located 165 kilometers northwest of the city of Chardzhou.

The Gugurtlinskoye uplift has a northwesterly strike and is composed of Paleogenic, Cretaceous, and Jurassic sedimentary rocks.

The Upper Jurassic is up to 360 meters thick and composed of carbonate beds. The Lower Cretaceous beds, up to 500 meters thick, are clay formations with layers of sandstone and interlayers of limestone.

The Upper Cretaceous, up to 920 meters thick, is composed mainly of sandstones and aleurolites.

Industrially feasible gas presence at the Gugurtlinskoye deposit is associated with the large stratigraphic complex of beds and can be traced from the Middle part of the Upper Jurassic to the lower part of the Albian Stage of the Lower Cretaceous. The productive horizons are identified from the top down in this rock mass (see Table 63 below).

Table 63. Description of the Productive Horizons of the Gugurtlinskoye Deposit

Horizon	Average Roof Depth, meters	Initial Layer Pressure, kg-f/cm^2	Layer Temperature, °C.
Lower Cretaceous			
XII	1,255	159.9	67
XIIa	1,455	157.5	73
XIIb	1,520	162.9	75
XIII	1,610	184.8	77
XIVa	1,680	193.9	80.5
XIVb	1,795	198.0	83.5
Upper Jurassic			
XV-XVI	1,910	203.4	86

[table continued, next page]

[Table 63, continued]

	Lower Jurassic		
XVII	2,150	228.0	95
XVIII	2,185	228.0	95.5
	Weathering Crust		
	2,240	240.0	97.5

The gas condensate pool with the largest volume is confined to horizons XV-XVI at depths of 1,910-2,256 meters. It is composed primarily of limestones.

The gases of the productive layers of the Cretaceous beds are uniform in hydrocarbon composition, contain small amounts of CO_2 and nitrogen, and have no hydrogen sulfide.

The composition of gases in the Jurassic beds differs from the gases of the Cretaceous beds by having slightly more CO_2 (up to 1.5 percent), containing hydrogen sulfide (to 0.2 percent), and heterogeneity with respect to methane homologues, whose concentration increases with depth. The greatest amount, up to 12-12.5 percent, is found in gases from horizon III [sic].

The gases of horizons VII and VIII contain more nitrogen also, up to five percent. The condensate content increases with depth too; the largest amount (up to 20 cubic centimeters per cubic meter) has been found in gases from Lower Cretaceous horizon XVIII (see Table 64, next page).

The Naip Deposit

This deposit is located 50 kilometers southeast of the Achakskoye deposit. It occurs in an uplift which has the appearance of a north-northeasterly-trending anticlinal fold.

Gas presence at this deposit has been established in beds of the Upper Jurassic and Lower Cretaceous. Thirteen productive layers have been singled out. Horizons IIa, IIb, and III are confined to Aptian sandstones; horizons IVv, V, and Va to the Neocomian, and VI, VII, VIII, IX, and X to the carbonate traps of the Upper Jurassic.

A description of the productive horizons is given below.

Beds	Aptian	Neocomian	Jurassic
Depth, meters	1,758-1,860	1,930-2,210	2,275-2,490
Layer Pressure, kg-f/cm^2	200-211	227-245	250-265
Temperature, °C.	84-87	92-99	>100

Table 65 (page after next) shows the composition of gases from the Naip deposit.

Table 64. Description of Gases from the Productive Layers of the Gugurtlinskoye Deposit

(a) Горизонт	(b) Содержание компонентов, %: CO_2	H_2S	CH_4	C_2H_6	C_3H_8	$i\text{-}C_4H_{10}$	$n\text{-}C_4H_{10}$	$i\text{-}C_5H_{12}$	$n\text{-}C_5H_{12}$	C_6+higher	N_2	(c) Плотность по воздуху	(d) Теплота сгорания низшая, ккал/м³
Мел (Cretaceous)													
XI	0,5	(e)	92,2	4,0	1,1	0,22	0,23	0,09	0,07	0,1	1,5	0,608	8390
XII	0,3	(e)	92,8	4,0	1,0	0,18	0,26	0,08	0,05	0,1	1,2	0,604	8390
XIII	1,0	(e)	93,5	3,2	0,8	0,15	0,17	0,05	0,04	0,08	1,0	0,603	8250
XIV	0,4	0,01	93,8	3,5	0,8	0,13	0,18	0,06	0,05	0,1	1,0	0,600	8330
Верхняя юра (Upper Jurassic)													
XV + XVI	1,0	0,19	92,4	3,8	0,8	0,14	0,15	0,05	0,04	0,1	1,3	0,607	8250
Нижняя юра (Lower Jurassic)													
XVII	0,8	0,01	89,7	4,5	1,2	0,20	0,26	0,09	0,08	0,15	3,0	0,623	8310
XVIII	0,5	<0,001	83,4	7,0	2,8	0,45	0,60	0,20	0,18	0,3	4,5	0,673	8790
Кора выветривания (Weathering Crust)													
XXI	0,7	(e)	80,4	7,5	3,3	0,50	0,80	0,90	0,50	0,5	4,9	0,717	9300

Key: (a) Horizon;
(b) Components, %;
(c) Density Relative to Air;
(d) Lowest Heat of Burning, $gcal/m^3$;
(e) None Detected.

Table 65. Composition of Layer Gas of the Naip Deposit (in percentage)

(a) Номер скважины	(b) Горизонт	H_2S	CO_2	CH_4	C_2H_6	C_3H_8	C_4H_{10}	C_6+higher	Конденсат (c) г/м³	Конденсат (c) см³/м³
2	IX, X	0,00015	0,96	89,9	4,5	1,7	0,46	1,03	49,3	66,5
9	IX, X	0,00015	0,79	91,1	4,36	1,32	0,50	0,98	46,4	62,6
8	IV	—	0,38	92,7	4,36	1,20	0,44	0,72	32,1	41,7
8	V	—	0,40	92,7	3,80	1,11	0,42	0,61	31,0	40,2
1	III	—	0,50	92,6	4,42	1,26	0,42	0,68	28,7	38,3
1	III	—	0,28	93,5	3,46	1,05	0,41	0,59	26,0	34,7

Key: (a) Well Number;
(b) Horizon;
(c) Condensate [units in left subordinate column are "g/m^3"].

The eastern region comprises three groups of gas deposits: those found near the city of Chardzhou -- Farab, Sakar, Samantepe; those near the city of Kushka -- Islim, Karachop; those in the vicinity of the city of Mary -- Bayramali, Mayskoye, Sharapli, Shatlyk, Keli, and Yelanskoye.

The Farab Deposit

This gas condensate deposit, located in the immediate vicinity of the city of Chardzhou, is confined to a brachyanticlinal fold with an amplitude of more than 500 meters.

The gas-bearing layer at the deposit is Upper Jurassic subsalt beds composed of fractured Callovian-Oxfordian limestone with low permeability. The gas pools that have been identified lie at great depth, 2,345-2,381 meters. Layer pressure in the pool is 241 kilogram-force per square centimeter; the temperature is 94 degrees C.

A weak flow of petroleum has been received from the subsalt beds in the depth interval 2,542-2,623 meters at this deposit.

The gases of the gas condensate pool of the Farab deposit have the following composition, in percentages:

CH_4 -- 90.3	$n\text{-}C_4H_{10}$ -- 0.22	C_6H_{14} + higher -- 0.3
C_2H_6 -- 4.5	$i\text{-}C_5H_{12}$ -- 0.10	N_2 -- 1.0
C_3H_8 -- 1.0	$n\text{-}C_5H_{12}$ -- 0.12	CO_2 -- 2.3
$i\text{-}C_4H_{10}$ -- 0.2		

The Sakar Deposit

The Sakar deposit is located 20 kilometers southeast of the city of Chardzhou in a brachyanticlinal fold 20 kilometers long and 18 wide. The gas pool has been identified in limestones and Upper Jurassic beds. An industrially feasible flow of gas was received when testing in the interval 2,640-2,690. The gas has a high hydrogen sulfide content (up to one percent), a large amount of CO_2 (as much as two percent), and low nitrogen content (0.5 percent), as Table 66 below shows.

Table 66 also reveals that the lower-occurring gases have much higher levels of methane homologues and nitrogen.

Table 66. Composition of Gas from the Sakar Deposit (in percentages)

Компоненты (a)	(b) Глубина опробованного интервала, м					
	2380	2615--2683	2631--2690	2673--2755 скв. 2 (m)	2790--2814 скв. 2 (m)	3142--3201 скв. 2 (m)
Метан (c)	94,3	92,8	93,5	81,6	69,3	76,6
Этан (d)	2,8	3,3	3,0	8,7	13,1	10,5
Пропан (e)	0,62	0,78	0,69	4,5	9,0	6,4
изо-Бутан (f)	0,13	0,18	0,15	1,0	1,5	0,8
н-Бутан (g)	0,13	0,24	0,17	0,4	2,1	1,1
изо-Пентан (h)	0,08	0,11	0,08	0,8	0,8	0,4
н-Пентан (i)	0,08	0,12	0,07	0,25	0,6	0,3
Гексан + высш. (j)	0,1	0,1	0,09	0,15	0,4	0,3
Азот (k)	0,8	0,4	0,5	1,6	1,6	2,0
Двуокись углерода (l)	1,0	2,0	1,8	1,0	1,6	1,6

Key: (a) Components;
(b) Depth of Sampled Interval, meters;
(c) Methane;
(d) Ethane;
(e) Propane;
(f) iso-Butane;
(g) n-Butane;
(h) iso-Pentane;
(i) n-Pentane;
(j) Hexane + Higher;
(k) Nitrogen;
(l) Carbon Dioxide.
(m) Well No 2.

The Samantepe Deposit

The Samantepe deposit is located 70 kilometers southeast of the city of Chardzhou.

The Samantepenskaya structure is confined to the western part of the Dengizkul'skiy Ridge and forms a large, gently inclined oval uplift with a west-northeasterly trend.

The cross-section of the sedimentary mantle shows Jurassic, Cretaceous, Paleogenic, and Neogenic-Quaternary beds.

Industrially feasible gas presence has been found in subsalt carbonate beds of the Upper Jurassic The gas pool of horizon XV is an arched, massive type confined to fractured Callovian-Oxfordian limestones. The full thickness of the productive limestone mass is 395 meters. The productive horizon occurs at a depth of 2,300-2,500 meters. Layer pressure is 276 kilogram-force per square centimeter, and the temperature is 98 degrees C, Signs of petroleum are present in horizon XV in both the gas and water-saturated parts of the pool.

The gas from the Samantepe deposit is a methane gas. The concentration of the other hydrocarbon components in the gas drops sharply as their molecular mass increases. Thus, propane does not exceed 0.5 percent, butane 0.2 percent, and pentane 0.1 percent.

A characteristic feature of gases from the Samantepe deposit is high levels of hydrogen sulfide (3.2 percent)* and carbon dioxide (to six percent). The concentration of nitrogen does not exceed one percent and the most condensate is about 10 cubic centimeters per cubic meter.

The composition of gases from the Upper Jurassic beds (horizon XV) is uniform through the entire thickness of the productive layer. The concentrations of components of the mixture change little within the bounds of the pool, and they may be described by the following average figures (see also Table 67, next page):

CH_4 -- 88.3	$n\text{-}C_4H_{10}$ -- 0.07	N_2 -- 0.5
C_2H_6 -- 2.3	$i\text{-}C_5H_{12}$ -- 0.05	CO_2 -- 5.0
C_3H_8 -- 0.38	$n\text{-}C_5H_{12}$ -- 0.04	H_2S -- 3.2
$i\text{-}C_4H_{10}$ -- 0.08	C_6H_{14} + higher -- 0.1	

The gas has a density of 0.649 relative to air. Its lowest heat of burning is 7,740 gigacalories per cubic meter and the highest is 8,580.

These gases are classified as high-calorie typical hydrocarbon gases according to their market features. The gas can only be used in gas supply when the hydrogen sulfide is removed (for use as a source of marketable sulfur) and it is dried in order that the gas can be transported reliably without using a CO_2 ballast mixture.

The Islim Deposit

The Islim deposit is located 5-7 kilometers from the city of Kushka, within an anticlinal northeasterly-trending fold. The southwest part of the fold is in Afghanistan.

Cretaceous and Jurassic beds contain gas at the deposit. Gas has been received from beds of the Cenomanian, Turonian, Neocomian-Aptian and Jurassic.

The Cenomanian beds are composed of interstratified thick sheets of calcareous clays and gray limestones. The gas received from these beds

* The H_2S content in gas from some Central Asian deposits varies and is not shown in tables.

Table 67. Composition of Gases from the Samantepe Deposit, in percentages

Номер скважины (a)	Интервал перфорации, м (b)	CO_2	CH_4	C_2H_6	C_3H_8	$i\text{-}C_4H_{10}$	$n\text{-}C_4H_{10}$	$i\text{-}C_5H_{12}$	$n\text{-}C_5H_{12}$	C_6+ higher	N_2
5	2410—2413	2,8	93,9	1,7	0,30	0,09	0,07	0,01	0,01	—	1,1
5	2467—2473	2,7	94,5	1,7	0,30	0,08	0,06	0,01	0,01	0,1	0,6
8	2498—2505	3,0	93,9	2,4	0,33	0,06	0,07	0,03	0,02	0,1	0,2
11	2463—2469	4,0	92,5	2,7	0,36	0,06	0,08	0,03	0,02	0,2	0,2
10	2472—2478	4,0	93,7	1,5	0,39	0,06	0,06	0,03	0,02	0,2	0,2
9	2495—2510	4,3	92,3	2,6	0,35	0,06	0,08	0,04	0,03	0,3	0,2
22	2511—2517										
	2517—2523	1,7	93,9	3,4	0,50	0,10	0,13	0,05	0,04	0,3	0,2
5	2413—2420	3,0	94,5	1,6	0,41	0,07	0,06	0,03	0,02	0,1	0,3
5	2467—2473	2,1	95,2	1,8	0,36	0,07	0,06	0,02	0,01	0,1	0,4
5	2494—2531	2,1	94,0	2,2	0,38	0,06	0,07	0,04	0,03	0,2	1,0
5	2385—2391	5,6	91,9	1,6	0,37	0,06	0,08	0,02	0,01	0,1	0,2
5	2352—2358	5,6	91,7	1,6	0,48	0,06	0,08	0,02	0,01	0,1	0,2
5	2494—2531	1,2	95,7	1,8	0,30	0,08	0,06	0,02	0,01	0,2	0,8
5	2352—2358	3,8	93,6	1,9	0,34	0,08	0,06	0,02	0,01	0,1	0,2
3	2446—2550	3,3	90,4	2,2	0,37	0,08	0,07	0,04	0,02	0,2	0,3
3	2368—2375	1,9	94,5	2,8	0,59	0,10	0,10	0,05	0,03	0,2	0,3
2	2399—2707	6,5	90,2	1,8	0,39	0,11	0,11	0,06	0,03	0,2	1,0
14	2440—2450	4,8	90,5	3,2	0,42	0,09	0,10	0,03	0,02	0,1	0,8

Key: (a) Well Number;
(b) Perforation Interval, meters;

has a high level of homologues of methane (up to 20 percent), nitrogen (to five percent), and CO_2 (to 2.5 percent). It contains no hydrogen sulfide.

The Turonian beds, composed of dense limestones, have produced a gas that is similar in composition to the gas of the massive, arched Cenomanian pool. The layer pressure is 248 kilogram-force per square centimeter and the temperature is 100 degrees C.

An arched, layered pool with layer pressure of 260 kilogram-force per square centimeter and a temperature of 113 degrees C. has been identified in the beds of the Neocomian-Aptian, which is represented by an alternation of thick limestones, clays, and sandstones. The composition of gases from this pool is similar to that of the gases found in the Cenomanian and Turonian beds. In the Jurassic beds, which are composed of fine-grained sandstones, is an arched, layered pool with layer pressure of 271.2 kilogram-force per square centimeter, exceeding hydrostatic pressure. The layer temperature in the pool is 117 degrees C. In addition to the gas it produces a significant amount of condensate with a density of 0.783 which contains about 30 percent aromatic hydrocarbons and up to two percent paraffins.

The gas has no hydrogen sulfide. In general, the gases of the Islim deposit have a high level of methane homologues and are closer in composition to the gases of petroleum-gas deposits.

Table 68 (next page) shows the composition of gas from the deposit.

The Karachop Deposit

This deposit is located 35 kilometers east of the city of Kushka, confined to a northeasterly-trending brachyanticlinal fold that is 13 kilometers long and six wide.

Industrially feasible gas is found at the deposit in carbonate beds of the Upper Cretaceous. Gas has been received from the Danian and Maastrichtian stages. The gas-bearing horizon of Danian sandstones lies at 640-720 meters. It is an arched, layered pool with layer pressure of 59 kilogram-force per square centimeter and a temperature of 50 degrees C. Table 69 below shows the composition of gas from the Cretaceous Cenomanian beds of the Karachop deposit.

Table 69. Composition of Gas from the Karachop Deposit, in percentage

Well Number	Depth,m	CO_2	CH_4	C_2H_6	C_3H_8	$i\text{-}C_4H_{10}$	$n\text{-}C_4H_{10}$	$i\text{-}C_5H_{12}$	$n\text{-}C_5H_{12}$	C_6+ higher	N_2
24	716—738	0,5	80,7	6,3	2,6	0,52	0,58	0,27	0,21	0,2	8,2
5	740—759	0,4	81,4	6,2	2,3	0,46	0,50	0,24	0,18	0,2	8,2
5	779—792	0,4	80,3	6,2	3,0	0,68	0,78	0,43	0,39	0,5	7,3
47	710—784	0,4	82,6	6,0	2,1	0,4	0,36	0,28	0,21	—	7,7
24	1348—1352	1,0	69,4	9,0	8,0	3,5		4,0		—	5,1

Table 68. Composition of Gas from the Islim Deposit, in percentage

Well Number	Depth, m	CO_2	CH_4	C_2H_6	C_3H_8	i-C_4H_{10}	n-C_4H_{10}	i-C_5H_{12}	n-C_5H_{12}	C_6+ higher	N_2
					Меловые отложения (Cretaceous Beds)						
1	1458—1480	1,0	77,8	10,0	4,7	0,8	0,6	0,30	0,18	0,1	4,5
2	1585—1490	1,0	73,5	9,8	4,9	1,0	1,0	0,59	0,33	1,0	6,9
2	1725—1870	2,2	75,7	9,6	4,5	0,91	0,84	0,49	0,27	0,5	5,0
1	1858—1879	1,0	77,2	9,7	4,4	0,85	0,76	0,50	0,30	0,4	4,9
2	1930—1950	2,4	76,3	8,9	4,4	0,81	0,75	0,40	0,23	0,3	5,5
2	2202—2225	2,8	69,3	9,3	4,2	0,97	0,81	0,54	0,33	0,4	11,3
2	2197—2222	2,4	75,0	10,6	3,7	0,83	0,78	0,40	0,23	0,4	5,7
2	2263—2282	2,2	70,8	9,6	4,6	1,11	1,17	0,75	0,45	0,5	8,8
2	2333—2420	2,5	76,1	9,0	4,4	1,0	0,9	0,4	0,35	0,3	5,0
1	2361—2422	0,9	77,5	9,2	4,5	0,58	0,55	0,29	0,18	0,3	6,0
					Отложения мел + юра (Beds of Cretaceous + Jurassic)						
2	2304—2422	2,0	74,2	10,8	5,0	1,16	1,21	0,45	0,35	0,3	4,4
					Юрские отложения (Jurassic Beds)						
1	2490—2528	3,0	67,3	12,5	6,3	1,74	1,87	1,22	0,75	1,0	4,3

Note: Hydrogen sulfide was not detected.

The Bayramli Deposit

The Bayramli gas deposit is one of the large ones in Turkmenistan. It is located 40 kilometers north of the city of Mary.

The geological structure of the deposit includes Jurassic, Cretaceous, Paleogenic, Neogenic, and Quaternary beds. This deposit was the first place in the Murbatskaya depression where the entire thickness of salt beds of the Upper Jurassic was penetrated and the subsalt Oxfordian limestones, which are promising for gas exploration in this region, were opened up.

Beds of the Karabil'skaya Series of the Lower Cretaceous contain industrially feasible gas at the deposit.

The gas pool is confined to the upper sandy mass of the series. The pool lies at 2,780-2,825 meters. It has a layer pressure of 302 kilogram-force per square centimeter and a temperature of 105 degrees C. The pool in the Karabil'skaya Series is an arched, floating pool.

This pool contains a methane gas (up to 98 percent) with only small amounts of methane homologues (up to 1.5 percent).

The gases from the Bayramli deposit do not contain the heavy hydrocarbons C_5 and higher or hydrogen sulfide. They have a small amount of nitrogen and CO_2.

The absence of gas condensate fractions and aggressive impurities makes the gas field technology much simpler.

The Mayskoye Deposit

This gas deposit is located 30 kilometers southeast of the city of Mary, within a narrow brachyanticline set directly south of the Bayramli deposit.

The structure is 15 kilometers long and 4.5 wide. Two domes, the northern and southern, have been identified in the structure.

The productive horizon of the Karabil'skaya Series of Neocomian-Aptian beds is composed of sandstones with clay interlayers and lies at a depth of 3,000-3,150 meters. The porosity of the traps is about 19 percent and permeability is 105 mD.

The initial layer pressure in the pool is 324 kilogram-force per square centimeter and the temperature is 124 degrees C. The pool is an arched floating type.

The composition of the gases from the deposit is similar to the composition of gas from the Karabil'skaya Series of the nearby Bayramli deposit. They have a high concentration of methane, a small amount of

of homologues of methane and impurities (nitrogen and carbon dioxide), and no hydrogen sulfide.

The composition of the gas is shown in Table 70 below.

Table 70. Composition of Gases from the Mayskoye Deposit, in percentage

Well Number	Depth, meters	CO_2	CH_4	C_2H_6	C_3H_8	$i\text{-}C_4H_{10}$	$n\text{-}C_4H_{10}$	N_2
			Cretaceous, Neocomian-Aptian					
3	3038—3048	1,0	96,8	1,2	0,15	0,02	0,01	0,7
			Cretaceous					
5	3058—3059	0,8	96,8	1,2	0,15	0,15	0,01	1,0
8	3034—3036	1,3	96,7	1,2	0,2	0,1		0,5
8	2324—2300	3,3	78,3	1,4	1,1	0,36		11,8
5	3053—3059	2,0	96,3	0,8	0,1	0,01		0,8
5	2726—2818	4,5	90,5	0,5	0,1	0,01		4,0
8	3066—3067	0,9	97,7	0,7	0,1	0,02		1,0

Note: The gases contain more than 0.1 percent of C_5 and higher.

The Sharapli Deposit

The Sharapli gas deposit is located 80 kilometers north of the city of Mary. Stratigraphically, the deposit is composed of Mesozoic-Cenozoic beds which have been opened up to a thickness of 3,800 meters.

The cross-section that has been revealed is identical to the cross-section at the Bayramli deposit.

The deposit is confined to a brachyanticlinal fold eight kilometers long and two wide. The sandstones of the Karabil'skaya Series of the Neocomian-Aptian, 120 meters thick, contain industrially feasible gas. The gas pool has been opened at a depth of 2,288-2,307 meters. Layer pressure is 251 kilogram-force per square centimeter and the temperature is 85 degrees C.

The gas from the Karabil'skaya Series at the Sharapli deposit is a methane gas. Its composition is as follows, in percentages:

CH_4 -- 95.5	$i\text{-}C_4H_{10}$ -- 0.02	N_2 -- 2.3
C_2H_6 -- 1.1	$n\text{-}C_4H_{10}$ -- 0.01	CO_2 -- 0.8
C_3H_8 -- 0.1	C_5H_{12}+ higher-- 0.1	

The Shatlyk Deposit

The Shatlyk gas condensate deposit is located in Maryyskiy Rayon, 60 kilometers southwest of the city of Mary. It comprises two anticlinal folds, the eastern and western, separated by a syncline.

The productive layer, the Karabil'skaya Series of the Lower Cretaceous, is composed of a stratum of sandy rocks with interlayers of clay, aleurolites, and dolomitized sandstones.

The depth of occurence is 3,345-3,442 meters at the eastern fold and 3,232-3,454 meters in the west.

The pool is arched. The deposit has a high initial layer pressure of 368 kilogram-force per square centimeter and a high temperature, 137 degrees C.

Table 71 below gives the composition of gas from the Shatlyk deposit.

Table 71. Composition of Gases from the Shatlyk Deposit, in percentages

Well Number	CO_2	CH_4	C_2H_6	C_3H_8	$i\text{-}C_4H_{10}$	$n\text{-}C_4H_{10}$	$i\text{-}C_5H_{12}$	$n\text{-}C_5H_{12}$	C_6+higher	N_2
1	1,24	95,7	1,7	0,23	0,04	0,03	0,02	0,01	0,2	1,0
3	1,3	95,0	2,4	0,27	0,06	0,010	0,06	0,07	0,1	0,8
4	1,28	95,1	2,4	0,24	0,04	0,05	0,02	0,02	0,1	0,7
4	1,30	93,3	2,6	0,25	0,08	0,12	0,05	0,04	0,1	2,2
5	1,4	94,6	2,4	0,24	0,08	0,10	0,04	0,02	0,1	1,0
22	0,27	95,4	2,1	0,32	0,10	0,11	0,04	0,03	0,1	1,5
101	1,30	94,3	2,4	0,30	0,09	0,10	0,05	0,03	0,1	1,3
111	1,27	95,6	2,3	0,28	0,10	0,12	0,06	0,03	0,1	1,1
31	1,35	94,6	2,2	0,27	0,09	0,11	0,05	0,03	0,1	1,2

The Keli Deposit

The Keli gas deposit is located 90 kilometers northwest of the city of Mary. It is confined to a narrow brachyanticlinal fold. Industrially feasible gas presence has been established in the Karabil'skaya Series of Neocomian-Aptian beds at a depth of 2,468-2,472 meters. The layer pressure is 264 kilogram-force per square centimeter. The pool is an arched, floating type.

The gases from all the dposits of the central part of the Murgabskaya depression, located in the vicinity of the city of Mary, (Lower Cretaceous gas complex) are methane gases with respect to composition. The methane concentration in them is 95-96 percent.

The average composition of gas from the Karabil'skaya Series of Lower Aptian beds is shown below.

CH_4 -- 95.2	$i\text{-}C_4H_{10}$ -- 0.03	
C_2H_6 -- 1.2	$n\text{-}C_4H_{10}$ -- 0.01	N_2 -- 3.0
C_3H_8 -- 0.15	C_5H_{12}+higher -- 0.1	CO_2 -- 0.3

The Yelanskoye Deposit

This deposit, located 80 kilometers northwest of the city of Mary, is confined to a brachyanticlinal fold 11 kilometers by 11 kilometers.

Quaternary, Neogenic, Paleogenic, and Cretaceous beds with a total thickness of 3,154 meters have been opened up at the deposit. The productive horizon of the Karabil'skaya Series at the arch of the fold is 2,850 meters deep. The initial layer pressure is 309.3 kilogram-force per square centimeter and the temperature is 108.5 degrees C. The pool is an arched, floating-type gas pool.

The gas is a methane type. It does not contain gas condensate hydrocarbon fractions or hyrdogen sulfide. The level of nitrogen and CO_2 is insignificant.

The gas has the following composition, in percentages:

CH_4 -- 96.0	$i\text{-}C_4H_{10}$ -- 0.03	N_2 -- 1.2
C_2H_6 -- 1.8	$n\text{-}C_4H_{10}$ -- 0.02	CO_2 -- 0.7
C_3H_8 -- 0.15	C_5H_{12}+higher -- 0.01	

11,176
CSO: 8144/0424

FUELS AND RELATED EQUIPMENT

UKRAINIAN COAL PRODUCTION FOR FIRST HALF OF 1978 REPORTED

Kiev UGOL' UKRAINY in Russian No 10, Oct 78 pp 51-52

[Article: "The UkSSR Coal Industry in the First Half of 1978"]

[Text] The Ukraine's miners extracted 106.44 million tons of coal during the first half of this year (table 1). The plan for coal mined for coking was met by 100.3 percent. The plan for labor productivity per worker for mining coal was met by 102.2 percent.

As of 1 July 1978 the republic's coal industry had 1,590 active breakage faces; the average active line of the breakage faces was 244.56 km, and the average monthly advance was 37.7 meters. The average daily extraction of coal per active breakage face was 384 tons. The daily production of one underground or strip mine (administrative unit) averaged 2,637 tons.

At underground mines, breakage faces that were mechanized in integrated fashion and equipped with cutter-loaders and single-bucket overhead excavators numbered 462 where seams were at gradient angles of less than 35 degrees. From these faces 49,111,000 tons of coal were mined under a plan for 48,990,000 tons, which was 57.4 percent of all that mined from operating breakage faces at seams with gradient angles of less than 35 degrees.

At seams with gradient angles of more than 35 degrees, there were 51 breakage faces mechanized in integrated fashion, including 48 that were equipped with AShch roof supports. Mined at steep seams were 1,512,000 tons under a plan for 1,510,000 tons, and the average daily workload per face was 205 tons.

For UkSSR Minugleprom [Ministry of Coal Industry] as a whole, the plan for the conduct of all preparatory excavation was met by 100.1 percent, and the plan for stripping and preparatory excavation by 98.9 percent (table 2). Excavation conducted with the mechanized loading of coal and rock was 981.9 km, or 76.8 percent of the total length of excavation conducted where loading was required.

Coal preparation workers of the republic's coal industry processed 66.53 million tons of coal and produced 40.31 million tons of clean coal at

preparation plants (table 3). The preparation volume and output of clean coal for coking and the processing of coal at mechanized rock-sorting installations were overfulfilled.

Table 1

	(1) Производственные объединения	(2) План, тыс. т	(3) Выполнение плана (4) тыс. т	(5) % к плану	(6) % к I полугодию 1977 г.
(7)	Донецкуголь	10 495	10 898	103,8	100,8
(8)	Макеевуголь	7 985	7 912	99,1	94,0
(9)	Красноармейскуголь	7 010	6 968	99,4	98,3
(10)	Добропольеуголь	5 675	5 517	97,2	96,1
(11)	Артемуголь	5 985	6 989	100,1	98,9
(12)	Орджоникидзеуголь	3 080	3 192	103,6	99,4
(13)	Шахтерскантрацит	6 300	6 330	100,5	93,8
(14)	Торезантрацит	5 455	5 512	101,0	99,3
(15)	Ворошиловградуголь	5 905	5 936	100,5	98,3
(16)	Стахановуголь	5 495	5 165	94,0	92,3
(17)	Первомайскуголь	5 295	4 998	94,4	94,8
(18)	Краснодонуголь	4 520	4 622	102,3	100,3
(19)	Донбассантрацит	11 595	11 632	100,3	98,6
(20)	Свердловантрацит	4 915	4 679	95,2	94,0
(21)	Павлоградуголь	4 360	4 550	104,6	103,6
(22)	Укрзападуголь	7 175	7 355	102,5	99,6
(23)	Александрияуголь	5 500	5 188	94,3	99,3
(24)	Минуглепром УССР	106 736	106 442	99,7	97,9

Key:

1. Production associations.
2. Plan, thousands of tons.
3. Plan fulfillment.
4. Thousands of tons.
5. Percent of the plan.
6. Percent of the first half of 1977.
7. Donets Coal Mining Association.
8. Makeyevka Coal Mining Association.
9. Krasnoarmeysk Coal Mining Association.
10. Dobropol'ye Coal Mining Association.
11. Artemovsk Coal Mining Association.
12. Ordzhonikidze Coal Mining Association.
13. Shakhtersk Anthracite Coal Mining Association.
14. Torez Anthracite Coal Mining Association.
15. Voroshilovgrad Coal Mining Association.
16. Stakhanov Coal Mining Association.
17. Pervomaysk Coal Mining Association.
18. Krasnodon Coal Mining Association.
19. Donbass Anthracite Coal Mining Association.
20. Sverdlovsk Anthracite Coal Mining Assocation.
21. Pavlograd Coal Mining Association.
22. Western Ukraine Coal Mining Association.
23. Aleksandriya Coal Mining Association.
24. UkSSR Ministry of Coal Industry.

Table 2

(1) Производственные объединения	(2) Проведение подготовительных выработок											
	(3) всех					(4) вскрывающих и подготавливающих						
	(5) План, км	(6) Факт., км	(7) % к плану	(8) % к по-этому 1977 г.		(5) План, км	(6) Факт., км	(7) % к плану		(8) % к по-этому 1977 г.		
(9) Донецкуголь	144,0	147,0	102,1	103,3		103,4	105,2	101,7		106,5		
(10) Макеевуголь	107,0	108,0	100,9	100,9		73,9	73,2	99,1		97,5		
(11) Красноармейскуголь	83,2	74,7	89,8	92,0		74,7	65,2	87,3		90,6		
(12) Добропольеуголь	88,5	84,3	95,3	93,7		59,2	51,6	87,2		92,1		
(13) Артемуголь	167,9	167,9	100,0	98,6		81,9	81,9	100,0		101,4		
(14) Орджоникидзеуголь	68,3	68,2	99,9	101,2		36,6	36,6	100,0		104,3		
(15) Шахтерскантрацит	69,7	72,0	103,3	100,8		47,2	48,0	101,7		100,8		
(16) Торезантрацит	62,0	65,8	106,1	105,6		41,6	41,8	100,5		98,8		
(17) Ворошиловградуголь	86,5	86,9	100,5	97,6		48,4	48,4	100,0		99,6		
(18) Стахановуголь	105,7	108,9	103,0	103,5		61,3	63,2	103,1		106,6		
(19) Первомайскуголь	81,2	78,8	97,0	99,4		56,2	57,3	102,0		101,2		
(20) Краснодонуголь	64,8	65,9	101,7	102,8		40,9	41,0	100,2		104,6		
(21) Донбассантрацит	135,6	135,1	99,6	94,9		69,0	70,7	102,5		99,6		
(22) Свердловантрацит	52,8	54,3	102,8	104,0		36,3	35,5	97,8		100,0		
(23) Павлоградуголь	56,8	55,1	97,0	101,1		52,5	51,2	97,5		101,6		
(24) Укрзападуголь	67,1	68,6	102,2	98,0		57,2	58,0	101,4		101,4		
(25) Александрияуголь	15,5	16,3	105,2	113,2		14,3	15,2	106,3		115,2		
(26) Минуглепром УССР	1456,6	1457,8	100,1	99,7		954,6	944,0	98,9		100,6		

Key:

1. Production associations.
2. Conduct of preparatory excavation.
3. For all preparatory excavation.
4. Stripping and preparatory excavation.
5. Plan, km.
6. Actual, km.
7. Percent of the plan.
8. Percent of first half year of 1977.
9. Donets Coal Mining Association.
10. Makeyevka Coal Mining Association.
11. Krasnoarmeysk Coal Mining Association.
12. Dobropol'ye Coal Mining Association.

[Key continued on next page]

13. Artemovsk Coal Mining Association.
14. Ordzhonikidze Coal Mining Association.
15. Shakhtersk Anthracite Coal Mining Association.
16. Torez Anthracite Coal Mining Association.
17. Voroshilovgrad Coal Mining Association.
18. Stakhanov Coal Mining Association.
19. Pervomaysk Coal Mining Association.
20. Krasnodon Coal Mining Association.
21. Donbass Anthracite Coal Mining Association.
22. Sverdlovsk Anthracite Coal Mining Association.
23. Pavlograd Coal Mining Association.
24. Western Ukraine Coal Mining Association.
25. Aleksandriya Coal Mining Association.
26. UkSSR Ministry of Coal Industry.

Table 3

Indices	Plan, Thousands of tons	Plan fulfillment		
		Thousands of tons	Percent of plan	Percent of first half of 1977
Processing of coal at preparation plants....	68,107	66,330	97.4	97.4
Processing of coal at mechanized sorting installations.....	5,613	5,659	100.8	88.0
Output of clean coal....	41,188	40,306	97.9	97.4
Output of large and medium grades.....	13,278	12,756	96.1	96.0
Anthracite (included)...	9,460	9,006	95.2	95.5

The mining brigades of N. N. Skrypnik from the Frunze sh/u [underground mine administration] of Donbassantratsit [Donbass Anthracite Coal-Mining Association], V. G. Murzenko from the Krasnyy Partizan Mine of Sverdlovantratsit [Sverdlovsk Anthracite Coal Mining Association], A. Ya. Kolesnikov from the Molodogvardeyskaya Mine, A. D. Polishchuk from the Trudovskaya Mine of the Donetskugol' Association, G. I. Motsak from the sh/u imeni Kosmavtov of Donbassantratsit, V. I. Ignat'yev from the Krasnolimanskaya Mine of Dobropol'yeugol' [Dobropol'ye Coal Mining Association], and many others, worked with high productivity during the first half of the year.

During the first half of the year, 174 tunneling brigades, having mastered high-speed penetration methods to perfection, made 211.81 km of preparatory excavation.

The planned amount of state capital investment for the first half of the year was assimilated by UkSSR Minugleprom as a whole by 101.0 percent, including 99.0 percent for construction and installing work; in the case

of facilities for production purposes, the plan for assimilating capital investment was fulfilled by 102.0 percent, including 100.1 percent for construction and installing work.

11409
CSO: 1822

END